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STUDIES IN THE GENERA OF THE *DIOSMEAE* (RUTACEAE): 13. A REVISION OF THE GENUS *ACMADENIA* BARTL. & WENDL.

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Abstract

Thirty-three species of the genus *Acmadenia* Bartl. & Wendl. are listed with diagnoses and keys. Descriptions have been prepared, where possible, from fresh material; distribution maps and lists of specimens examined are given. Five new species, *A. rourkeana, A. latifolia, A. maculata, A. baileyensis, A. faucitincta* are described.

Uittreksel

STUDIES IN DIE GENERA VAN DIE *DIOSMEAE* (RUTACEAE): 13. 'N HERSIENING VAN DIE GESLAG *ACMADENIA* BARTL. & WENDL.

Die drie-en-dertig soorte van die geslag *Acmadenia* Bartl. & Wendl. met diagnose en sleutels word gekatalogiseer. Beskrywings is so ver as moontlik van vars materiaal gemaak; verspreidingskaarte en lyste van bestudeerde monsters word gegee. Vyf nuwe soorte, *A. rourkeana, A. latifolia, A. maculata, A. baileyensis, A. faucitincta* word beskryf.

Historical Background

The first species of *Acmadenia* to be described was written up as *Diosma tetragona* in 1781 by Linnaeus' son. It was collected by Sparrmann probably in the vicinity of Attaquas Kloof. About the same time Thunberg must have collected his *Diosma obtusata* in the vicinity of the Sundays River.

The generic name *Acmadenia* means sharp gland and refers to the conical gland at the apex of the anther which is to be found in some species in the genus. The name *Acmadenia* was proposed by Bartling & Wendland in their revision of the *Diosmeae* published in 1824. Of the five species enumerated by them: *A. tetragona* (L.f.) Bartl. & Wendl. has been maintained and chosen as the type species of the genus; *A. pungens* has been transferred to *Euchaetis; A. laevigata* has also been transferred to *Euchaetis* but as *E. meridionalis* Williams to avoid creating a homonym; *A. obtusata* sensu Bartl. & Wendl. has been described de novo as *A. laxa* Williams; and *A. juniperina*

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has been found to be synonymous with *A. obtusata* (Thunb.) Bartl. & Wendl.

In 1830 Chamisso described *A. alternifolia* previously collected by Mund & Maire at Hangklip somewhere along the south Cape coast.

Ecklon & Zeyher in their *Enumeratio Plantarum* (1835) list eight species of *Acmadenia*, two of which, *A. flaccida* and *A. mundiana*, were new to science, four were misidentified and one *A. muraltioides* is a later synonym of *A. obtusata* (Thunb.) Bartl. & Wendl. One species originally placed in *Adenandra* by them was transferred to *Acmadenia* as *A. trigona* by Druce in 1917.

Sonder in his revision of the *Rutaceae* for the *Flora Capensis* (1860) recognised fourteen species. Of these six, *A. densifolia, A. nivenii, A. alternifolia, A. tetragona, A. mundiana* and *A. flaccida* have been maintained; three have been transferred to *Euchaetis* and one to *Agathosma*. Two have had their names changed and two others have been reduced to synonymy.

Link in his list of plants growing in the Royal Botanic Gardens at Berlin (1821) described *Diosma teretifolia* although his plant had at that time not yet bloomed. Phillips, who later examined the flowers, transferred it to *Acmadenia* in 1920.

Dümmer in *Fedde's Repertorium* (1913) described four species of *Acmadenia*, two of which, *A. gracilis* and *A. burchellii*, have been maintained, one *A. neglecta* reduced to synonymy with *A. mundiana* and one transferred to *Diosma* as *D. apetala*.

Glover, in the *Annals of the Bolus Herbarium* (1915), described one species, *Acmadenia heterophylla*, and proposed another as a variety of *A. obtusata* which Compton, in 1932, raised to the rank of species as *A. macropetala*.

Dümmer in the *Annals of the Bolus Herbarium* (1921) described *Diosma marlothii* from the Matroosberg, which Phillips, in the *Journal of South African Botany* (1943), transferred to *Acmadenia* as *A. matroosbergensis*.

Acmadenia banosmoides described by Dümmer in the *Journal of Botany* (1912) has been transferred to *Phyllosma* and *Acmadenia marlothii* described by Dümmer in the *Annals of the Bolus Herbarium* (1912) has been transferred to *Agathosma*.

Compton's *Diosma wittebergensis* published in the *Transactions of the Royal Society of South Africa* (1931) was transferred to *Acmadenia* in 1978.

Leading up to this paper eleven new names have been published in the *Journal of South African Botany* since 1974 and five more are included here.

DISTRIBUTION

All the species of *Acmadenia* except one, are to be found growing within an area in the South and South Western Cape Province that includes the

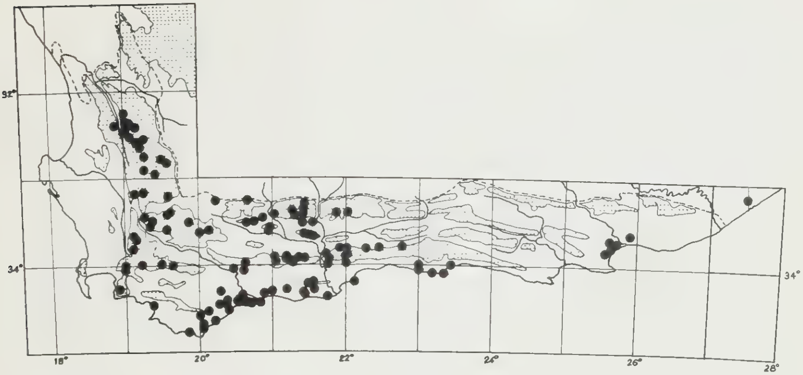

FIG. 1.
Known distribution of the genus *Acmadenia*. Line of dashes shows northern limit of Cape Geological Series. Dotted areas represent mountainous regions. Large black dots show actual areas where collections have been made.

mountain ranges of the Cape Geological Series marked on the map by a broken line (Fig. 1). A very isolated population of A. *kiwanensis* occurs further to the east where the plants are found growing associated with outcrops of quartzitic sandstone that may well be outliers of this geological series. The bulk of the species are concentrated between the 19 and 22 degree lines of longitude, that is from a line from Kogelberg to Clanwilliam in the west to about Mossel Bay in the east. No species of *Acmadenia* has so far been found to occur on the Cape Peninsula or on the coastal plain from False Bay northwards.

East of the Keurbooms River mouth, a disjunction of 210 km is found before *A. obtusata* occurs again in the vicinity of the Koega and Sundays Rivers. After a further disjunction of 165 km *A. kiwanensis* is found quite near to East London. All species of *Acmadenia* are to be found growing in soils associated with or derived from Table Mountain Sandstone, Witteberg Quartzite or the Bredasdorp Limestone beds. As far as is known they are never found growing in clay soils derived from the Malmesbury or Bokkeveld Series.

GENERIC DESCRIPTION

Acmadenia Bartl. & Wendl. *Diosmeae* in Beitr. Bot. **1**: 59 (1824); A. Juss. in Mém. Mus. Hist. Nat. Paris. **13**: 473 (1825) excl. fig.; Don, Gard. and Bot. **1**: 785 (1831); Eckl. & Zeyh., Enum. Plant.: 105 (1835); Endl., Gen. Plant. **2**: 1158 (1840); Steud., Nom. Bot. **1**: 17 (1841); Lindl. Veg. Kingd.: 471 (1853); Sond. in Fl. Cap. **1**: 379 (1860); Benth. and Hook., Gen. Plant. **1**: 289 (1862–1867); Engl., Pflanzenfam. **19a**: 273 (1931); Dyer, Gen. S.Afr. Flow. Pl. **1**: 290 (1975). Type species: *A tetragona* (Linn.f.) Bartl. & Wendl. (*Diosma tetragona* Linn.f.).

Diosma Thunb. Prodr. Plant. Cap. **1**: 84 (1794) in part; Dietr. Synops. Plant. **1**: 827 (1839).

Adenandra Eckl. and Zeyh. in part.

Bucco Roem. and Schult., Syst. Veg. **5**: 444 (1819) in part.

Shrubs 0,3 to 1 m tall, usually single-stemmed at base. *Branches* short, variously bent, becoming glabrous; bark somewhat rough, greyish-brown. *Branchlets* short, fairly erect, usually puberulous, well clothed with leaves. *Leaves* 1,8–15 mm long, 1–4,2 mm broad, linear, linear-lanceolate, oblong-lanceolate, elliptic, ovate or orbicular, obtuse or acute, sessile or short-petiolate, often complicate when dry, erect, often imbricate, adpressed or spreading, gland-dotted, opposite or alternate; margins glandular-denticulate, ciliate or eciliate; midrib prominent. *Inflorescence* 4–25 mm diam., terminal, often solitary, pink or white. *Bracts* one or sometimes two, leaf-like or reduced. *Bracteoles* two, much reduced. *Calyx* deeply divided; *lobes* 5, persistent. *Petals* five, in most cases clawed, often bearded and bent inward at the throat. *Staminodes* five, vestigial or short, normally glabrous, glandular or pointed at the apex, not protruding. *Filaments* five, short, acicular, normally glabrous. *Anthers* five, 2-locular, dorsifixed, not protruding; apical gland immersed, semi-immersed, globose or pointed, or large and conical. *Pollen* triporate, oblong. *Disc* obvallate, exceeds the ovary, often equals the stigma at first. *Stigma* capitate. *Style* short, glabrous, usually erect, in 5 species only at some stage deflexed. *Ovary* normally 5-carpellate, about 1 mm diam., in 1 species 4-carpellate, 1 species 3-carpellate and 1 species 2-carpellate; apices globose, glabrous, puberulous or sparsely pubescent, sometimes bifid or sometimes retuse with an immersed gland. *Fruit* normally 5-carpellate (in one species, only one or two carpels develop to maturity), either exposed or hidden beneath the persistent calyx lobes, in most cases with horns very short. *Seed* usually 2,3–5,5 mm long, 1,3–2,2 mm broad, black, shining; aril white or partly black; exceptions are *A. wittebergensis* and *A. patentifolia* which have still larger seeds and *A. flaccida* where the seed is matt not shining.

Diagnostic Characters

The genus *Acmadenia* is distinguished by having: (1) petals clawed, if they are bearded then the beard not a transverse fringe of hairs as in *Euchaetis* but rather a rounded patch of pubescence; (2) staminodes present, although in some cases very short or rudimentary; (3) style and filaments very short, never carrying the stigma or the anthers beyond the throat of the flower; (4) anthers with an apical gland, in two species much reduced.

ARRANGEMENT OF SECTIONS

The genus may be conveniently divided into the following sections:

1. *Acmadenia* section *Macrostylioides* which is distinguished by having only one or two carpels developing in each fruit. (Species no. 1).

2. *Acmadenia* section *Peltatiglandula* which is distinguished by having leaves, bracts and calyx lobes fringed with raised peltate or discoid glands. (Species nos. 2 to 4).

3. *Acmadenia* section *Patentipetalum* which is distinguished by having the petals spreading, revealing the gynoecium. (Species nos. 5 to 11).

4. *Acmadenia* section *Glandula* which is distinguished by having the flower with petals close together at the throat, concealing the gynoecium and with the anther bearing a small apical gland. (Species nos. 12 to 22).

5. *Acmadenia* section *Acmadenia* which is distinguished by having the flower with petals close together at the throat concealing the gynoecium and with the anther crowned with a large conical gland. (Species nos. 23–30).

6. *Acmadenia* section *Albiflos* is distinguished by having flowers with snow-white petals, closed at the throat and fruits with carpels bifid at the apex. (Species nos. 31–33).

KEY TO THE SPECIES OF *ACMADENIA*

1	Leaves with glandular denticulate margins	2
1+	Leaves with margins ciliate or eciliate	4
2	Flowers with the stigma simple	**2. bodkinii**
2+	Flowers with the stigma capitate	3
3	Leaves flat on the adaxial surface	**3. macradenia**
3+	Leaves with a groove along the adaxial surface	**4. rourkeana**
4	Ovary 2-carpellate, fruit with carpels two-horned	**33. candida**
4+	Ovary 3 to 5-carpellate	5
5	Ovary 3 or 4-carpellate	6
5+	Ovary 5-carpellate	7
6	Ovary 3 or 4-carpellate, flower with the throat closed, fruit with carpels two-horned	**32. nivea**
6+	Ovary 4-carpellate, flowers with the throat open, fruit with carpels entire	**11. tetracarpellata**
7	Flowers distinctly coloured at the throat	**31. faucitincta**
7+	Flowers not distinctly coloured at the throat	8
8	Flowers standing open exposing the gynoecium	9
8+	Flowers with the throat closed, petals bulged inwards at the claw	15
9	Leaves flat, flowers pedicellate	**1. flaccida**
9+	Leaves not flat, flowers sessile	10
10	Leaves terete, obtuse	**7. teretifolia**
10+	Leaves linear-lanceolate, oblong-linear, ovate, oblong or oblong-lanceolate; acute or obtuse	11
11	Style at some stage deflexed	12
11+	Style always erect	13
12	Flowers 9 mm diam., ± 5-nate	**5. wittebergensis**
12+	Flowers 13 mm diam., solitary	**6. tenax**

13	Petals white	**10. patentifolia**
13+	Petals pink or lilac	14
14	Petals pink, obovoid, narrowing evenly to the base	**8. matroosbergensis**
14+	Petals lilac, orbicular, narrow-clawed	**9. argillophila**
15	Anthers with a small globose or slightly pointed apical gland not more than 0,6 mm long	16
15+	Anthers with a large pointed apical gland more than 0,6 mm long	29
16	Fruits with horns about 4 mm long	**17. alternifolia**
16+	Fruits with horns not more than 1,5 mm long	17
17	Leaves alternate in mature plants	18
17+	Leaves opposite	22
18	Leaves elliptic, obtuse	**20. mundiana**
18+	Leaves lanceolate or linear-lanceolate, acute	19
19	Leaves with a pale white bristly apical callus	**18. kiwanensis**
19+	Leaves with a pale pink, red or brown glabrous apical callus	20
20	Leaves crisped ciliate	**19. densifolia**
20+	Leaves sparsely ciliolate or scabrid ciliolate	21
21	Leaves with a few minute black stalked glands on the adaxial surface, margins thick	**22. maculata**
21+	Leaves without any black stalked glands, margins thin	**21. obtusata**
22	Leaves elliptic	23
22+	Leaves lanceolate, linear-lanceolate or lanceolate-elliptic	24
23	Petals pubescent at the middle of the claw	**12. fruticosa**
23+	Petals pubescent at the sides of the claw	**24. heterophylla**
24	Petals glabrous at the throat	25
24+	Petals pubescent at the throat	27
25	Bracts 8 mm long	**13. burchellii**
25+	Bracts 2 mm long	26
26	Leaves linear-lanceolate, 1,5–2 mm broad	**14. trigona**
26+	Leaves lanceolate-elliptic, 4 mm broad	**15. latifolia**
27	Leaves lanceolate, obtuse, petals puberulous	**16. laxa**
27+	Leaves linear-lanceolate, acute, petals pubescent at the throat	28
28	Calyx lobes oblong obtuse	**21. obtusata**
28+	Calyx lobes narrowing evenly to an acute apex	**23. gracilis**
29	Leaves alternate in mature plants	30
29+	Leaves opposite	31
30	Calyx lobes narrowing evenly to an acute apex	**23. gracilis**
30+	Calyx lobes oblong, sub-acute	**25. rupicola**
31	Petals pubescent at the sides of the claw	**24. heterophylla**
31+	Petals pubescent at the middle of the claw	32
32	Leaves sub-orbicular when pressed flat	**30. tetragona**
32+	Leaves oblanceolate, oblong, lanceolate or linear-elliptic	33
33	Leaves oblanceolate, filament and staminodes sparsely pubescent	**29. baileyensis**
33+	Leaves oblong, lanceolate or linear-elliptic	34
34	Leaves oblong, filament and staminodes glabrous	**27. sheilae**
34+	Leaves lanceolate or linear-elliptic, adpressed erect	35
35	Leaves ciliolate	**28. macropetala**
35+	Leaves crisped ciliate	**26. nivenii**

1. **ACMADENIA** sectio **MACROSTYLIOIDES** Williams, sect. nov. propria propter carpella in quoque fructo unus vel duo solum maturescens.

Section *Macrostylioides* is distinguished by having only one or two carpels developing in each fruit.

Contains only one species:

1. Acmadenia flaccida Ecklon & Zeyher, Enum. Plant.: 105 (1835). Type: in terra ericeta (altit. II, III) montium prope Brackfontein (Clanwilliam), –/10/– *Ecklon & Zeyher 823* (SAM, lectotype; C, G, K, P, S, W, isotypes).

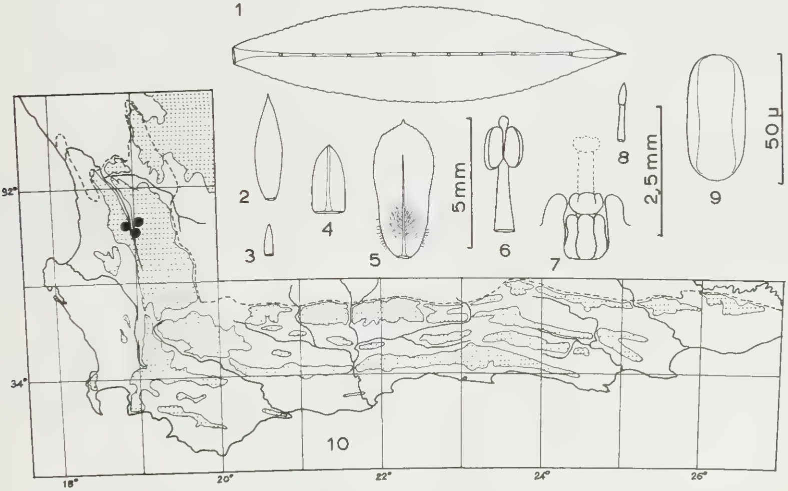

FIG. 2.
Acmadenia flaccida: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, anther. 7, gynoecium. 8, staminode. 9, pollen. 10, distribution.

Shrubs up to 1 m tall, slender, diffuse, single-stemmed at base. *Branches* few, dichotomous, rod-like, smooth, glabrous, brown, exocortex splitting off. *Branchlets* arising in pairs to either side of the main stem which terminates in an inflorescence, very slender, smooth, straight, glabrous, gland-dotted. *Leaves* up to 15 mm long, 3,7 mm broad, lanceolate, acute, mucronate, fairly flat, glabrous, glaucous, sessile, erect, opposite; margins crenulate, gland-dotted at the nodes, quite thick; midrib gland-dotted, gibbous behind the apex. *Inflorescence* terminal, up to 3 opposite pairs of flowers on a short peduncle; *flower* 7,5 mm diam., white, pedicellate, stands open. *Bract* 4 mm long, 1 mm broad, leaf-like. *Bracteoles* two, 1,2 mm long, 0,3 mm broad, leaf-like, much reduced, situated at the base of the pedicel. *Calyx lobes* five, 2,5 mm long, 1,3 mm broad, oblong, sub-acute, glabrous, glaucous, purplish towards the midrib, margins thin. *Petals* five, 3–5,3 mm long overall; *limb* 1,5–2,3 mm diam., orbicular, spreading; *claw* 1,5 mm long, 1,1 mm broad, pubescent about the middle, sparsely ciliate towards the middle at the sides. *Staminodes* five, 0,5–1,1 mm long, with a conical gland at the apex, glabrous. *Filaments* five, becoming 0,9–1,6 mm long, subulate, glabrous. *Anthers* five, 0,75 mm long, 0,75 mm broad, pinkish-orange, apical gland with a long tapering point completely deflexed between the lobes of the anthers. *Pollen* 48–54 μ long, 22–25 μ broad, oblong. *Disc* obvallate, green, exudes nectar, equalling the stigma at first. *Stigma* 0,6 mm diam., capitate, flat on top, 5-lobed, green, glossy. *Style* becoming 1,2–1,3 mm long, erect, glabrous. *Ovary* 5-carpellate, 0,9 mm long, 0,8 mm diam., glabrous, apices globose. *Fruit* 5-carpellate, usually 4 aborted, 1 fertile, 12 mm long, 2,8 mm broad, glabrous, gland-dotted, pinkish; *horn* 5,5 mm long. *Seed* 5 mm long, 2,3 mm broad, black, matt; aril white.

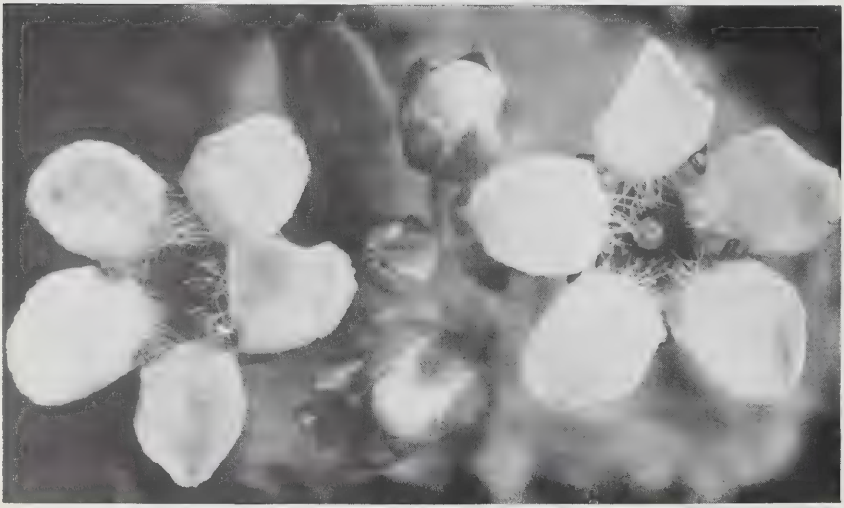

FIG. 3.
Acmadenia flaccida: Paired flowers showing bearded petals, spent anthers and stigma.

Acmadenia flaccida was first collected, most probably, by Carl Zeyher who collected in the Clanwilliam district about 1829. Many duplicates of this collection were distributed under the joint names of *Ecklon & Zeyher 183*. A specimen housed in the herbarium of the South African Museum at Kirstenbosch has been chosen as the lectotype. It was not until nearly 100 years later in 1927 that this plant was again collected, this time by Dr. M. R. B. Levyns. The above description done from fresh material amplifies those previously given.

Specimens Examined

CAPE—3218 (Clanwilliam): Haarwegskloof above Marcuskraal (not Brakfontein), Clanwilliam Division (-BD), 1 050 ft., 11/7/1975, *Williams 2015* (NBG).
—3219 (Wupperthal): in terra ericeta (altit. II, III) montium prope Brakfontein (Clanwilliam) (-AC), –/8/–, *Ecklon & Zeyher 823* (C, G, K, P, S, SAM, W); Nieuwoudt Pass. Cedarbergen, Clanwilliam Division, 7/9/1938, *Hafström & Acocks 791* (K, S); Algeria, Cedarberg, 1 500 ft., –/3/1928, *C.N. 349* (BM), 21/6/1942, *Esterhuysen 7850* (BOL, K, NBG, SAM), 2 000–2 500 ft., 30/8/1963, *Taylor 5080* (K, PRE, STE), 14/2/1936, *Compton 6249* (NBG), –/9/1927, *Levyns 2192* (SAM), 2 000 ft., 12/11/1969, *Taylor 7501* (STE), 2/8/1937, *Esterhuysen 723* (BOL); south west slopes of the Middelberg, Algeria, –/3/1940, *Esterhuysen 2522* (BOL, GRA, K); Middelberg, Cedarberg, 16/12/1941, *Esterhuysen 7289* (BOL); foot of Uitkyk Pass, 30/3/1956, *Esterhuysen 25556* (BOL); bottom of Cedarberg Pass, Algeria, 2 000 ft., 13/2/1973, *Williams 1760* (NBG).

Distribution

This species is very local. It is found at altitudes of between 320 and 600 m (1 000–2 000 ft.) in rather arid situations between Citrusdal and Clanwilliam near the Olifants river and near Algeria in the Cedarberg.

Acmadenia flaccida is recognised as distinct having staminodes 0,5–1,1 mm long, anthers with a large pointed deflexed apical gland, paired flowers and leaves large, flat, opposite, glabrous and glaucous.

2. ACMADENIA sectio **PELTATIGLANDULA** Williams, sect. nov. propria propter folio glandulo-denticulata.

Section *Peltatiglandula* is distinguished by having plants bearing glandular-denticulate leaves.

Contains species:

2. *A. bodkinii*
3. *A. macradenia*
4. *A. rourkeana*

2. Acmadenia bodkinii (Schltr.) Strid in Op. Bot. **32**: 101 (1972). Type: CAPE—3219 (Wupperthal): In montibus Cedarbergen prope montem Sneeuwkop et Wupperthal, Clanwilliam Division (-AC), 3 500–4 500 ft. alt., –/10/1897, *Bodkin s.n.* (BOL *8629*, holotype).

Adenandra bodkinii Schltr. in Journ. Bot. **36**: 315 (1898). Type: as above.

Shrubs up to 0,7 m tall, usually much less, fairly erect, fairly well branched, single-stemmed at base. *Branches* short, more or less arising in clusters of 2 to 6, fairly erect, becoming glabrous; leaf scars not prominent. *Branchlets* short, erect, pubescent, bearing scattered stalked glands, well clothed with leaves. *Leaves* 7 mm long overall including the petiole 1,5 mm long, 3 mm broad, obovate, obtuse, alternate, sub-imbricate, adpressed towards the base, recurved above, sub-complicate; sparsely pubescent with occasional

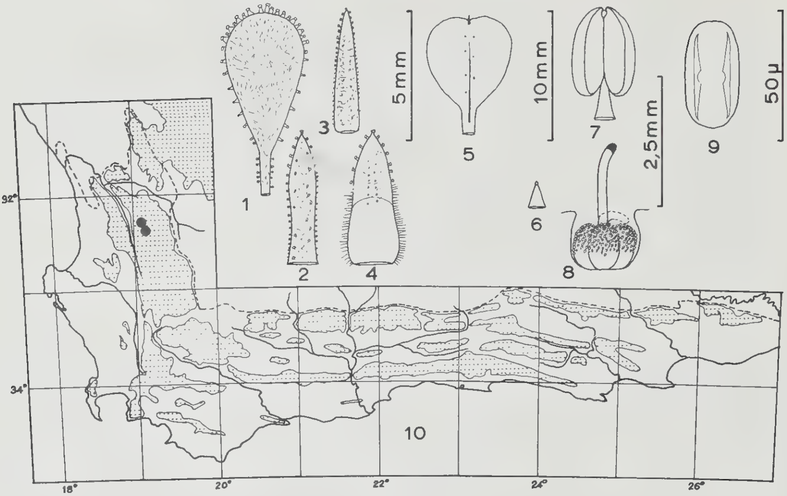

FIG. 4.
Acmadenia bodkinii: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, staminode. 7, anther. 8, gynoecium and disc. 9, pollen. 10, distribution.

stalked glands on both surfaces; margins glandular-dentate, apical gland much larger. *Inflorescence* solitary or twin, terminal; *flowers* 18 mm diam., petals whitish, spreading, with calyx lobes protruding between the petals. *Appendage*: at the apex of each branchlet, beside the flower and the other bud or incipient shoot, there is a terminal process which may be called a *caudal appendage* 4,5 mm long, terete, pubescent, reddened above with a discoid gland at the apex. *Bract* 5,2 mm long, 1 mm broad, linear-oblong, acute, white below, green above; midrib prominent; apex somewhat viscid with a discoid gland; margins with large stalked discoid glands above and many smaller ones below; adaxial surface pubescent; abaxial surface pubescent with erect hairs well spaced out and with small stalked glands scattered in between. *Bracteoles* two, 4,7 mm long, 1 mm broad, linear-lanceolate, acute, viscid, otherwise similar to the bract. *Calyx lobes* five, 5 mm long, 2 mm broad, lanceolate, acute, viscid; apex with a stalked discoid gland; margins above with 4–6 similar stalked glands to either side of the apex, below villous ciliate; sparsely pubescent on both surfaces mainly towards the apex, purplish above, distinctly veined below; midrib with stalked glands to either side. *Petals* five, 8,5–9 mm long overall; *limb* 6,5–7 mm long, 6,2–6,8 mm broad, obcordate, emarginate, apiculate, glabrous, white, spreading, minutely gland-dotted along the pink midrib; *claw* 2 mm long, 1 mm broad, glabrous. *Staminodes* five, 0,5 mm long, deltoid, apex with a minute gland, glabrous, decurrent below buttressing the disc. *Filaments* five, becoming 1,2 mm long, narrowly deltoid, glabrous, decurrent below buttressing the disc after the manner of an *Adenandra*. *Anthers* five, 1,7 mm long, 1,2 mm broad, reddened; apical gland minute, clasped between the incurved apices of the thecae. *Pollen* 41 μ long, 21 μ broad, ellipsoid. *Disc* obvallate, exceeds the ovary, level above, reddened, exudes nectar. *Stigma* 0,2 mm diam., simple, dark purple. *Style* at first deflexed, becoming erect 1,6 mm long, glabrous. *Ovary* 5-carpellate, 0,9 mm long, 1,3 mm diam., densely covered with stalked glands. As the ovary develops it produces a most fantastic array of hairy stalked glands. *Fruit* 5-carpellate, each carpel 7 mm long, 3 mm broad, glabrous, clothed above with numerous erect processes with glandular apices and pubescent sides, the largest towards the apex. *Seed* 4 mm long overall, 1,8 mm broad, black, shining; aril somewhat canted over inwards.

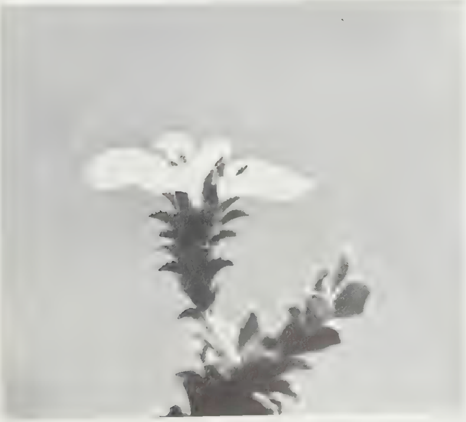

FIG. 5.
Acmadenia bodkinii: flower with calyx lobes projecting above the petals.

This plant was transferred to *Acmadenia* by Strid as part of his revision of the genus *Adenandra*. As he remarked, it is "a very isolated species", but as it possesses staminodes and anthers with a minute apical gland and also having the filaments and style short, it would seem to fit well enough into the genus *Acmadenia*. The glandular dentate leaves place this plant in the section *Peltatiglandula* which includes two other most unusual species. The above description done from fresh material may amplify those previously given.

SPECIMENS EXAMINED

CAPE—3219 (Wupperthal): in mont Cedarberg prope Sneeuwkop et Wupperthal, inter 3 500 et 4 500 ped. (-AC), –/10/1897, *Bodkin s.n.* (BOL *8629*); near Crystal Pool, Cedarbergen, Clanwilliam Division, 4 400 ft., 22/9/1930, *Barnes s.n.* (BOL *19315*), 25/6/1942, *Esterhuysen 7910* (BOL, K), 10/12/1965, *Dahlgren & Strid 4488* (NBG); Cedarberg below Sneeuwkop, plateau near Crystal Pool stream, 5 000 ft., 13/2/1973, *Williams 1761* (NBG), 7/10/1975, *Williams 2093* (NBG); rock crevices in massive rock on Scorpionsberg, north Cedarbergen, 5 000 ft., 26/10/1945, *Esterhuysen 12226* (BOL, NBG); Crevassberg, Cedarberg, rocky places, c. 5 000 ft., 1/6/1973, *Esterhuysen 33200* (BOL), 9/11/1969, *Taylor 7473* (STE), *Taylor 8454* (STE); rock crevices on peak at Koupoort, north Cedarberg, 4 000–5 000 ft., 22/10/1945, *Esterhuysen 12135* (BOL, NBG).

DISTRIBUTION

Acmadenia bodkinii is found growing at altitudes of between 1 200 and 1 500 m (4 000–5 000 ft.) in rock crevices in the Cedarberg in the vicinity of Crystal Pool, Skorpionsberg, Crevassberg and Koupoort a distance from north to south of only 11 km.

Of those species of *Acmadenia* with glandular denticulate leaves *A. bodkinii* is distinct in having the stigma simple and the anther with a minute gland clasped at the apex. It has leaves that are very much more pubescent than those of *A. macradenia* and which are flat on the adaxial surface without any groove as in *A. rourkeana*. The leaves even when dry have a strong smell of cedarwood oil.

3. **Acmadenia macradenia** (Sond.) Dümmer in Ann. Bol. Herb. **3** (2): 87 (1921). Type: In locis lapidosis (altit. III) laterum montium prope "Waterfall" vallis "Tulbagh" (Worcester), Dec., *Ecklon & Zeyher 789* (MEL, lectotype; S, TCD, isotypes).

Adenandra macradenia Sonder in Fl. Cap. **1**: 389 (1860). Type: as above.

Adenandra coriacea Eckl. & Zeyh., Enum. Plant.: 100 (1835) non Licht. nec Roem. et Schult. Type: as above.

Acmadenia macradenia (Sond.) Dümm. var. *borealis* Dümm. in Ann. Bol. Herb. **3** (2): 87 (1921). Type: Cape Province: South Western Region: Piquetberg Division, Piquetberg, Oct. 1895, *H. Bolus 8420* (BOL, holotype).

Shrubs 0,3–0,5 m tall, single-stemmed at base, dwarfed by the exposed conditions. *Branches* somewhat erect, fairly straight, rigid, glabrescent; bark smooth, dark brown. *Branchlets* fairly slender, erecto-patent, few, reddened as though varnished, sparsely villous, leafy. *Leaves* up to 15 mm long, 5,5 mm broad, decreasing in size towards the flowers to about 7 mm long, 3 mm broad, elliptic or oblong-elliptic, obtuse, spreading-erect, alternate; apex

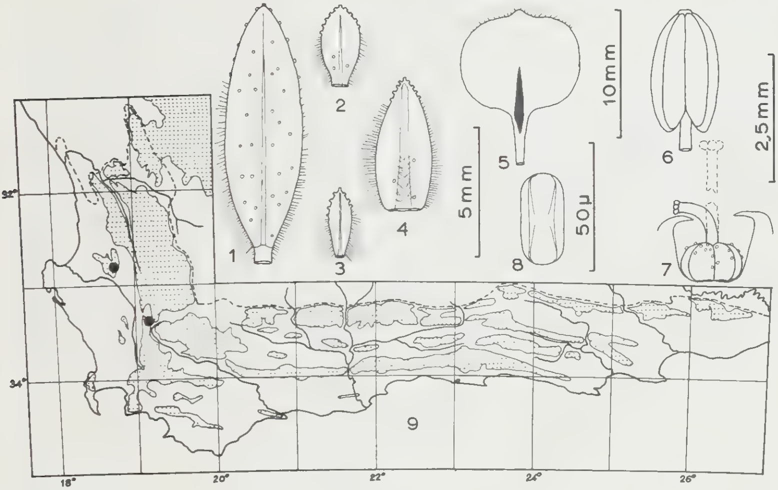

FIG. 6.
Acmadenia macradenia: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, anther. 7, gynoecium and disc. 8, pollen. 9, distribution.

with a raised discoid gland; margins thick glandular-denticulate towards the apex, laxly villous below and gland-dotted; narrowing at the base to a short petiole; adaxial surface smooth, flat, shining, glabrous; abaxial surface fairly flat with a slightly raised midrib and with scattered raised glands to either side. *Inflorescence* pedicellate, solitary or twin, at the ends of very short branchlets often found in small groups, white flushed with pink and having the appearance of an *Adenandra*. *Bract* one, 3–4 mm long, 1,5–2,5 mm broad, elliptic or orbicular, obtuse, glabrous, viscid, erect at base of pedicel; apex with a raised discoid gland; margins thick, glandular-denticulate above, villous below; abaxial surface with up to 3 raised glands. *Bracteoles* two, 2,6 mm long, 0,8 mm broad, oblanceolate, acute, glabrous, viscid, at base of pedicel; apex with a raised discoid gland; margins with raised glands towards the apex, villous below. *Pedicel* 5 mm long, villous. *Calyx lobes* five, 5 mm long, 2,2 mm broad, lanceolate, acute; apex with a raised discoid gland; margins thick with raised glands towards the apex, villous below; abaxial surface glabrous with 2 or 3 raised glands in the lower half; midrib villous. The erect glandular apices project upwards between the petals within the flower. *Petals* five, 12 mm long overall; *limb* 8 mm long, 9,2 mm broad, sub-orbicular, obtuse-apiculate, villous ciliate above; adaxial surface white, midrib with a flash of red at the throat; abaxial surface reddened becoming somewhat pink towards the midrib; *claw* glabrous, very narrow. *Staminodes* five, vestigial, the disc with an obtuse apex at this point, more easily visible in dried material as a small withered point about 0,1 to 0,2 mm long. *Filaments* five, becoming 2 mm long, 0,3 mm diam., stout, erect, acicular, purplish or wine-coloured, glabrous. *Anthers* five, before anthesis 2,4 mm long, 1,3 mm broad, wine-coloured, truncate at the apex without any apparent gland; when dry a sessile semi-globose gland 0,1 diam., is visible. *Disc* exceeds the ovary by a long way, closing somewhat over it, dark green, flattened above, exudes nectar. *Pollen* 35 μ long, 17 μ broad, oblong. *Stigma* 5-lobed, each lobe somewhat globose, 0,5 mm diam., capitate, pale green. *Style* at first deflexed, becoming erect, 2,5 mm long, glabrous. *Ovary* 5-carpellate, 0,7 mm long, 1,2 mm diam., apices bearing raised glands. *Fruit* 5-carpellate, 8,5 mm long overall, 6 mm diam.; *carpels* glabrous, shining, sparsely scattered with raised glands; *horns* spreading-erect, adaxially canaliculate, glabrous. *Seed* not seen.

Having been collected in December, specimens of this plant distributed by Ecklon and Zeyher (under the mistaken name of *Adenandra coriacea*) were without flowers, with the result that Sonder, in writing it up for the *Flora Capensis*, saw fit to place it in the genus *Adenandra* as *Adenandra macradenia*.

A fragment in bloom collected by Bolus in October 1895 on the Piquetberg was examined by R. A. Dümmer who assigned it to the genus *Acmadenia* proposing the new combination *Acmadenia macradenia* and at the same time describing Bolus's plant as a variety.

However, specimens of *A. macradenia* recently collected in the Kluitjieskraal Forest Reserve near Wolseley exactly match the fragment collected by Bolus and so the name *A. macradenia* var. *borealis* has been reduced to synonymy. The above description done from fresh material amplifies those previously given which were based upon a few very fragmentary specimens.

SPECIMENS EXAMINED

CAPE—3218 (Clanwilliam): Piquetberg, –/10/1895, *H. Bolus 8420* (BOL). —3319 (Worcester): In locis lapidosis laterum montium prope "Waterfall" vallis "Tulbagh" (-AC), Altit III, –/12/–, *Ecklon & Zeyher 789* (MEL, S, SAM, TCD); Kluitjieskraal Forest, summit of pass over Watervalsberg, Wolseley, 2 000 ft. alt., 1/9/1973, *Williams 1863* (NBG), 8/11/1974, *Williams 1924* (NBG), 20/10/1960, *van Breda 1054* (PRE); St Sebastians Kloof and environs on crest of ridge, exposed on top of rocks, specimen only one visible, 2 500 ft. alt., –/9/1939, *Stokoe 7096* (BOL).

DISTRIBUTION

From the very few collections ever made of this species it would appear to be confined to the summits of rocky ridges in the mountains to the west of Wolseley. The single collection of a mere fragment from the Piquetberg by

H. Bolus in 1895 has never been repeated or confirmed and represents a possible disjunction of about 75 km in the distribution of this species.

Acmadenia macradenia with glandular-denticulate leaves, pedicellate flowers, vestigial staminodes and with anthers truncate at the apex is a most distinct species. Having leaves that are fairly flat with the midrib not very prominent make it easily distinguished from *Acmadenia rourkeana* which has leaves with a prominent midrib and the adaxial surface longitudinally grooved. The leaves when crushed have a strong smell reminiscent of scented verbena or of *Eucalyptus citriodora.*

4. Acmadenia rourkeana Williams, sp. nov. earum follis glandulo-denticulatis et floribus pedicellatis propria propter folia nervo medio prominenti et pagino adaxiali sulcato.

Frutex humilis, ad basim ramulosis. *Rami* brevi, graciles, nigrescentes, glabrescentes. *Ramuli* brevi, graciles, sparsim villosi, foliosi. *Folia* 6–8,8 mm longa (petiolo 1 mm longo incluso), 3–4,3 mm lata, elliptica, alterna, erecto-patentia; apex obtusis, peltato-glandulosis; margines crassi, sparsim villoso-ciliati, glandulo-denticulati; pagina adaxialis sulcata, sparsim villosa; pagina abaxialis glanduloso-punctata nervo medio prominenti, sparsim villosa. *Inflorescentia* terminalia, solitaria, pedicellata. *Bractea* imo pedicello, 3,3 mm

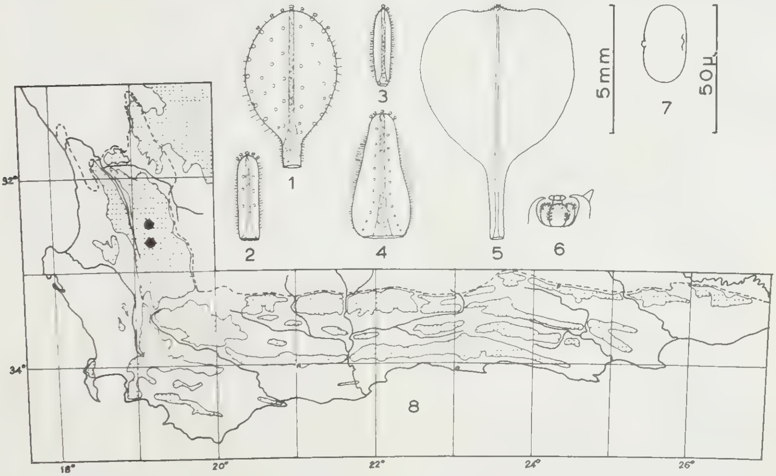

Fig. 7.
Acmadenia rourkeana: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, gynoecium and disc. 7, pollen. 8, distribution.

longa, 0,8 mm lata, linearis, obtusa, apex versus 5-stipitato-glandulosa, ciliata, costa puberula. *Bracteolae* duae, imo pedicello, 3 mm longae, 0,7 mm latae, lineares, obtusae, ciliatae, apice glanduloso, costa puberula. *Sepala* quinque, 4,8 mm longa, 2–2,3 mm lata, lanceolata, obtusa; apex versus 5–7-stipitato-glandulosa, petala excedentia marginibus ciliatis, nervo medio prominenti puberulo stipitato-glanduloso. *Petala* quinque, 9 mm longa in toto; limbus 6 mm lata, sub-orbiculais, apex versus ciliata; *unguis* 3 mm longus, 0,6 mm latus, glaber. *Staminodia* quinque, 0,3–0,5 mm longa, deltoidea, glandula c. 0,1 mm diam., coronata. *Filamenta* quinque, 1 mm longa, subulata, vinosa, glabra. *Antherae* quinque, c. 1,1 mm longae, oblongae, vinosae, glandula 0–0,1 mm longa, coronata. *Pollen* 30 μ longum, 17 μ latum, ellipsoideum. *Discus* ovarium includens, vinosus. *Stigma* 5-lobatum, 0,4–0,7 mm diam., discoidea. *Stylus* 0,5 mm longus, glaber, erectus. *Ovarium* 5-carpellatum, 0,8 mm longum, 1,3 mm diam., apicibus pubescentis, lateribus peltato-glandulosis. *Fructus* 5-carpellatus, 6 mm longus, 5 mm diam., viridus, puberulus, lateribus peltato-glandulosis; *cornua* 1,5 mm longa, echinulata, vinosa, erecta. *Semen* 3,2–4,3 mm longum, 1,7–1 mm latum, piceum, nitens.

Type: CAPE—3219 (Wupperthal): near Sneeuwberg hut, South Cedarberg, Clanwilliam Division (-AC), 3 500–4 000 ft. alt., 31/8/1963, *Esterhuysen 30285* (BOL, holotype).

Shrubs low, much branched at base, developing long branches where mingling with taller shrubs, growing from rock crevices or amongst rocks. *Branches* slender, short, glabrescent, becoming almost black. *Branchlets* very slender, short, sparsely villous, leafy. *Leaves* 6–8,8 mm long, 3–4,3 mm broad, elliptic, alternate, spreading-erect; apex obtuse with a peltate gland; margins somewhat recurved, sparsely villous, gland-dotted and with about 6 peltate glands to either side of the apex; adaxial surface flat, sparsely villous, with a groove up the middle; abaxial surface with scattered raised glands; midrib villous, prominent. *Inflorescence* terminal, solitary or occasionally pseudo-paired; *pedicel* 7–20 mm long, villous with scattered peltate glands. *Bract* one at the base of the pedicel, 3,3 mm long, 0,8 mm broad, linear, obtuse with 5 peltate glands at the apex, ciliate; midrib puberulous with 3 peltate glands to either side. *Bracteoles* two at the base of the pedicel, 3 mm long, 0,7 mm broad, linear, obtuse with peltate glands at the apex, ciliate; midrib puberulous with 1–2 minute peltate glands. *Calyx lobes* five, 4,8 mm long, 2–2,3 mm broad, lanceolate, obtuse with 5–7 peltate glands at the apex, ciliate, wine-coloured above and projecting between the petals; midrib raised, puberulous with minute peltate glands to either side. *Petals* five, 9 mm long overall, white except at the midrib and throat where pink; *limb* 6 mm long, 6 mm broad, sub-orbicular, villous ciliate towards the apex; *claw* 3 mm long, 0,6 mm broad. *Staminodes* five, 0,3–0,5 mm long, conical, wine-

coloured, apical gland c. 0,1 mm diam. *Filaments* five, 1 mm long, subulate, glabrous, wine-coloured. *Anthers* five, c. 1,1 mm long, oblong, wine-coloured; apical gland minute, 0–0,1 mm long, very hard to see. *Pollen* 30 μ long, 17 μ broad, ellipsoid. *Disc* exceeds the ovary and closes over it, flat on top, wine-coloured. *Stigma* 5-lobed, 0,4–0,7 mm diam., discoid, capitate. *Style* 0,5 mm long, erect, persistent, glabrous. *Ovary* 5-carpellate, 0,8 mm long, 1,3 mm broad; carpels pubescent at the apices, with peltate glands at the sides. *Fruit* 5-carpellate, 6 mm long, 5 mm diam.; carpels puberulous with peltate glands towards the sides, pubescent along the apical suture; *horns* 1,5 mm long, erect, oblong, echinulate, dark-reddened. *Seed* 3,2–4,3 mm long, 1,7–2 mm broad, black, shining.

Acmadenia rourkeana was apparently first collected both by Professor R. H. Compton and by Dr Joyce Lewis in September 1936 in the Elandskloof Mountains between Ceres and Citrusdal, a very adventurous road in those days. It remained unidentified for many years until mistakenly named *Acmadenia macradenia* to which species it bears some resemblance.

SPECIMENS EXAMINED

CAPE—3219 (Wupperthal): Slangvlei, Cedarberg (-AC), *Andrag 260* (STE); near Sneeuwberg hut, South Cedarberg, Clanwilliam Division, 3 500–4 000 ft. alt., 31/8/1963, *Esterhuysen 30285* (BOL), 4 150–4 350 ft., 30/11/1976, *Williams 2245* (NBG); rugged slopes east side of Sneeuwberg, south Cedarbergen, 4 000 ft., 11/10/1946, *Esterhuysen 13090* (BOL); slopes below Apollo peak, south Cedarbergen, 4 000 ft., 13/12/1950, *Esterhuysen 18041* (BOL); Duivelskloof, Cedarberg, –/9/1950, *Stokoe s.n.* (SAM *64180*); Elandskloof, Ceres/Clanwilliam Division, 26/9/1936, *Lewis s.n.* (BOL *22051*), 3/10/1940, *Bond 637* (NBG); Elandskloof Mtns., 4 000 ft., 25/9/1936, *Compton 6559* (NBG); Elandskloof, on south slope amongst rocks, 4 000 ft., 3/10/1940, *Esterhuysen 3153* (BOL, GRA, SAM); in sheltered rock crevice, 3 000 ft., 3/10/1940, *Esterhuysen 3154* (BOL, GRA, K).

DISTRIBUTION

Acmadenia rourkeana is found growing amongst rocks at altitudes of from about 900 to 1 200 metres (3 000–5 000 ft.) in the mountains to the east of Citrusdal in the Clanwilliam Division.

Of those species of *Acmadenia* with glandular-denticulate leaves *Acmadenia rourkeana* is recognised as distinct having leaves with a groove running up the middle of the adaxial surface and with the midrib prominent. It differs from *A. macradenia* which has leaves more glabrous and flat without any groove on the adaxial surface, with the midrib not so prominent and with the raised glands not so much stalked. It differs from *A. bodkinii* which has the flowers sessile and not pedicellate and leaves without any groove on the adaxial surface, much more pubescent and with margins much more glandular-denticulate. The leaves when crushed have a very faint rich nutty smell.

This species has been named in honour of Dr J. P. Rourke, Curator of the Compton Herbarium at Kirstenbosch, who has for many years been a good friend giving great help and encouragement to me in my work.

3. ACMADENIA section **PATENTIPETALUM** Williams, sect. nov. propria propter petalia patentes omnibus expositis.

Section *Patentipetalum* is distinguished by having the petals spreading, revealing the anthers and gynoecium.

Contains species:

5. *A. wittebergensis*
6. *A. tenax*
7. *A. teretifolia*
8. *A. matroosbergensis*
9. *A. argillophila*
10. *A. patentifolia*
11. *A. tetracarpellata*

5. Acmadenia wittebergensis (Compton) Williams in Jl S. Afr. Bot **44** (4): 359 (1978). Type: CAPE—3320 (Montagu): Witteberg (Whitehill), south slope, Laingsburg Division (-BC), 1067 m (3 500 ft.), 11/8/1924, *Compton 2524* (BOL, lectotype).

Diosma wittebergensis Compton in Trans. R. Soc. S. Afr. **19**(3): 297 (1931). Type: as above.

Acmadenia wittebergensis is recognised as being distinct because of having thick pointed crowded leaves, pubescent bracts, bracteoles and calyx lobes, short conical staminodes with conical glands on the anthers and a multi-stemmed habit. It is perhaps nearest to *A. teretifolia* which however has much shorter obtuse leaves.

6. Acmadenia tenax Williams in Jl S. Afr. Bot **45**(2): 166 (1979). Type: CAPE—3319 (Worcester): uppermost left-hand fork of Jan du Toits Kloof, Hex River Mountains; near Mount Brodie, Worcester Division (-AD/CB), 1 646 m (5 400 ft.), 18/2/1978, *Esterhuysen 34852* (BOL, holotype; E, K, L, LD, M, MO, NBG, PRE, S, isotypes).

Acmadenia tenax is recognised as distinct because of being a tough, glabrous plant growing on cliffs, with relatively large white flowers, having anthers with a small sessile globose apical gland and a style at first deflexed, the fruit glabrous with horns 3–5 mm long. Only three other species of *Acmadenia* have the style deflexed at first, *A. teretifolia, A. tetracarpellata* and *A. wittebergensis*, but all of these have fruits with truncated or very short horns. Of all the species of *Acmadenia* with white flowers, *A. tenax* has the largest petals.

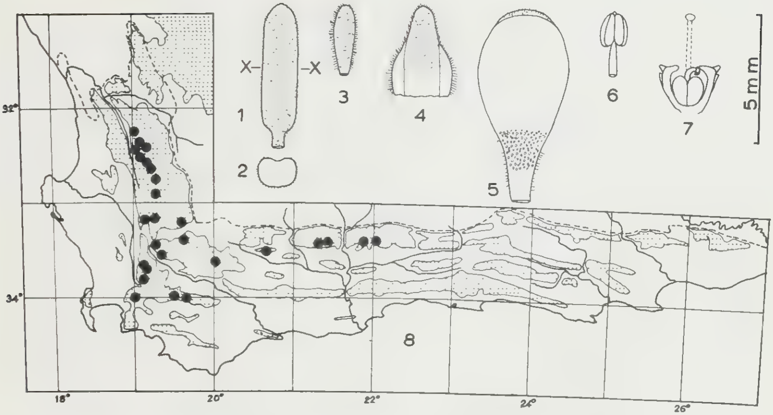

FIG. 8.
Acmadenia teretifolia: 1, leaf. 2, section of leaf. 3, bracteole. 4, calyx lobe. 5, petal. 6, anther. 7, gynoecium.

7. Acmadenia teretifolia (Link) Phillips in Kew Bull.: 23 (1920). Type: *Diosma ferulacea*, Kew, 1815 (GOET, lectotype).

Diosma teretifolia Link, Enum. Plant.: 237 (1821). Type: as above.

Acmadenia teretifolia (Link) Dümmer in Ann. Bol. Herb. **3**(2): 87 (1921). nom. superf.

Acmadenia teretifolia (Link) Phillips var. *glabrata* (Sond.) Phillips in Kew Bull.: 23 (1920).

Acmadenia teretifolia (Link) Dümmer var. *glabrata* (Sond.) Dümmer in Ann. Bol. Herb. **3**(2): 88 (1921). nom. superf.

Diosma teretifolia Link var. *glabrata* Sonder in Fl. Cap. **1**. 376 (1860).

Diosma ferulacea Hort. Kew. nom. nud.

Shrubs up to 0,4 m tall, dense, sprawling, with many stems arising from a stout root growing in crevices in massive T.M.S. rocks. *Branches* numerous, spreading, short, brown, glabrous, roughened with leaf scars. *Branchlets* fairly erect, slender, short, numerous, thinly puberulous. *Leaves* 5 mm long, 1,3–1,5 mm broad, sub-terete, obtuse, at first puberulous becoming glabrous, somewhat erect, alternate, crowded, abruptly narrowing below to a petiole 0,6 mm long; apex with an immersed callus; adaxially flattened-canaliculate; abaxially rounded, without margins or midrib, gland-dotted. *Inflorescence* terminal, 2–3 nate, sessile, stands open, subtended by a leaf-like bract. *Bracteoles* two, 2,7 mm long, 0,8 mm broad, leaf-like, ciliolate, adaxially flattened, abaxially sparsely puberulous. *Calyx lobes* five, 3,5 mm long, 2,3 mm broad, broadly, lanceolate, thinly puberulous, ciliate; apex obtuse, thickened, reddish; margins translucent below. *Petals* five, spreading, about 7,5 mm long, 3,5 mm broad, ovate, pink, apex curled inwards and sparsely puberulous abaxially, narrowing below; *claw* 0,7 mm wide at base, adaxially papillose, margins sparsely ciliolate. *Staminodes* five, small glands c. 0,2 mm diam., pointing outwards at 45°. *Filaments* five, 1 mm long, glabrous, acicular. *Anthers* five, before anthesis 1,3 mm long, 0,9 mm broad; apical gland 0,1 mm long. *Pollen* 42 μ long, 20 μ broad, oblong. *Disc* obvallate, slightly curled inwards, exceeds the ovary, exudes nectar. *Stigma* 0,4 mm diam., capitate. *Style* at first deflexed, becoming erect, 2,7 mm long, glabrous, slender. *Ovary* 5-carpellate, 1,2 mm diam., apices puberulous. *Fruit* 5-carpellate, 6,5 mm diam., globose without horns; carpels glabrous, gland-dotted; apices emarginate, sparsely puberulous. *Seed* 4,1 mm long, 2 mm broad, black, shining; aril black.

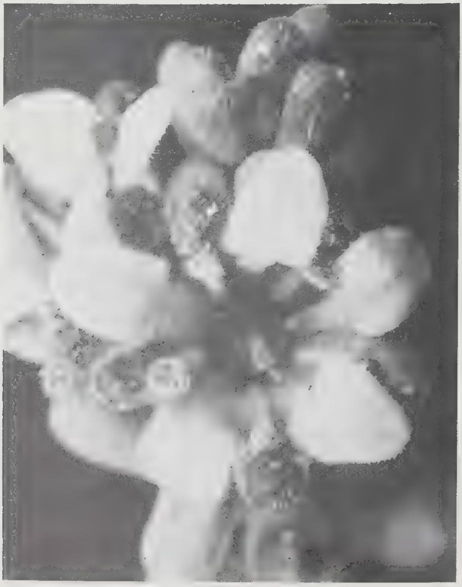

FIG. 9.
Acmadenia teretifolia: flower showing disc and staminodes.

In his list of plants growing in the Royal Botanic Gardens at Berlin, published in 1821, Dr H. F. Link gives the source of his material as *Hort. angl.* meaning that he obtained his plant from the Royal Botanic Gardens at Kew. He also mentions that it had not yet flowered. The type in Link's herbarium at Berlin was destroyed by fire during the 1939/45 war. However, a fragment, without flowers, preserved in the herbarium at Göttingen and labelled *Diosma ferulacea, Kew, 1815*, would appear to be part of the type material. It has been selected as the lectotype. This plant has leaves that are so distinctive that there can be no mistaking the species and, as an additional clue, the manuscript name given at Kew, *ferulacea* means *fennel like* referring to the smell of the leaves when crushed. The leaves of this plant have a very strong smell of liquorice or perhaps aniseed when crushed. The above description amplifies those already given by previous authors.

Specimens Examined

CAPE—3219 (Wupperthal): Krakadouw Peak, Cedarberg, Clanwilliam Division (-AA), 5 700 ft., 30/12/1941, *Esterhuysen 7491* (BOL), 5 000 ft., 26/10/1923, *Pocock 666* (STE), –/1/1942, *Stokoe s.n.* (NBG, SAM *59378*); Sneeuwkop summit, Cedarberg, Clanwilliam Division (-AC), 6 300 ft., 13/10/1923, *Pocock 215* (STE), 6 000 ft., 12/2/1936, *Compton 6247* (NBG), 6 200 ft., –/12/1941, *Stokoe s.n.* (SAM *59376*), 6 360 ft., –/2/–, *Leipoldt 651* (BOL, GRA, SAM), 6 000 ft., 2/1/1942, *Esterhuysen 7575* (BOL); Langberg, Cedarberg, Clanwilliam Division, 6 200 ft., 15/12/1941, *Bond 1382* (NBG), 6 100 ft., 24/1/1963, *Rycroft 2622* (NBG), 6 100 ft., 15/2/1973, *Williams 1766* (NBG), 6 000 ft., 15/12/1941, *Esterhuysen 7318* (BOL); Suurvleiberg summit, Cedarberg, Clanwilliam Division, –/3/1940, *Esterhuysen 2554* (BOL, GRA); prope Wupperthal, –/10/1897, *Bodkin s.n.* (BOL *8957*, K); plateau south of Tafelberg, Cedarberg, 5 000 ft., 29/12/1962, *Esterhuysen 29999a* (BOL); Apex Peak, South Cedarberg, Clanwilliam Division (-CA), 5 000 ft., 1/4/1961, *Esterhuysen 28976* (BOL); Sneeuwberg, summit, South Cedarberg, 6 600 ft., 1/3/1947, *Esterhuysen 13833* (BOL), 6 000–6 600 ft., 1/9/1963, *Taylor 5089a* (PRE), 6 500 ft., 16/5/1966, *Taylor 6824* (STE), 22/7/1972, *Andrag 1110* (STE); Donkerkloofkop, S. Cedarberg, Clanwilliam Division, –/9/1950, *Stokoe s.n.* (SAM), 6 000 ft., –/1/1944, *Stokoe 9148* (BOL, SAM); Top of Heksberg, –/3/1951, *Stokoe s.n.* (SAM *65570*); Kafferkop Summit northern Cold Bokkeveld, 4 760 ft., 8/3/1973, *Williams 1772* (NBG); Sandfontein, South Cedarberg, Ceres Division (-CB), 5 000 ft., 6/4/1953, *Esterhuysen 21318* (BOL); Gideonskop, 5 000 ft., 6/4/1947, *Esterhuysen 13885* (BOL); Blaauwkop, Cold Bokkeveld, Ceres Division, 5 500 ft., to summit, 1/10/1958, *Esterhuysen s.n.* (BOL); Schoongezicht Peak, Ceres Division (-CC), 4 400 ft., –/4/1939, *Stokoe 7677* (BOL); Cold Bokkeveld Tafelberg, Ceres Division (-CD), 6 200 ft., 22/1/1897, *Schlechter 10098* (BM, G, GRA, K, BOL, P, PRE, SAM, W), 8/12/1940, *Bond 694* (NBG), 8/12/1940, *Esterhuysen 3924* (BOL); Schurveberg summit above Excelsior, Cold Bokkeveld, Ceres Division, 4 958 ft., 8/12/1976, *Williams 2258* (NBG), 1/1/1962, *Esterhuysen 29434* (BOL, PRE).

—3319 (Worcester): Ad montem Winterhoeksberg prope Tulbagh (-AA), *Ecklon & Zeyher 827* (MEL, S), 1 100 m, 2/1/1887, *Marloth 1650* (PRE), 6/12/1896, *A. Bolus s.n.* (BOL); Sneeuwgat Peak, Great Winterhoek Peak, summit, 6 000 ft., 30/12/1951, *Esterhuysen 19758* (BOL); Little Winterhoek Mountain, –/4/1926, *Stokoe s.n.* (BOL); Hansiesberg, Cold Bokkeveld, Ceres Division (-AB), 6 000 ft., 17/12/1944, *Compton 16704* (NBG), 17/12/1967, *Jackson s.n.* (NBG), 18/4/1956, *Esterhuysen 25757* (BOL); Skurfdebergen, Gydouw, Ceres Division, –12/1891, *H. Bolus 7576* (BOL); Mostertshoek Twins (-AD), 6 500 ft., 8/1/1944, *Wasserfall 783* (NBG), *Esterhuysen 9857* (BOL); Buffelshoek Peak, Hex River Mountains, 6 500 ft., 26/12/1942, *Esterhuysen 8411* (BOL); Baviaansberg, west of Karroopoort, Ceres Division (-BA), 6 000 ft., 4/11/1962, *Esterhuysen 29807* (BOL); Matroosberg, Ceres Division

(-BC), –/1/1941, *Stokoe s.n.* (G, SAM *30583)*, 2 200 m, –/5/1894, *Marloth 1995* (PRE), 7 000 ft., –/1/1917, *Phillips 1968* (K, SAM), 5 000-6 500 ft., 7/4/1958, *Esterhuysen 27722* (BOL), 2 000 m, –/1/1897, *Marloth 2343* (BOL, GRA, PRE, SAM), 7 400 ft., 2/1/1897, *A. Bolus s.n.* (BOL *6360*, K, NBG *4393)*,–/12/1895, *A. Bolus s.n.* (BOL *3968*), 2 100 m, 2/1/1897, *Marloth 2367* (STE), 2 200 m, –/12/1895, *Marloth 2280* (STE); Slanghoek Pile summit, Worcester Division (-CA), 5 000 ft., –/1/1940, *Esterhuysen 1731* (BOL); Witteberg summit, 6 000 ft., 9/2/1943, *Esterhuysen 8691* (BOL); Dutoitskloof in Slanghoek, (III,A,e,10), 2 500-3 000 ft., 29/2/1828 *Drège s.n.* (P); Dutoitskloofberge near Wagemakersvlei, (III,A,e,10), 2 500-3 000 ft., 10/1/1828, *Drège s.n.* (G, K, P *1877*, W); Slanghoek Peak summit, 5 000 ft., 17/1/1969, *Jackson s.n.* (NBG); Dutoits Peak summit, Worcester Division (-CC), 2 000 m, –/1/1899, *Marloth 9376* (PRE), 6 700 ft., 26/1/1943, *Esterhuysen 8579* (BOL); Wemmershoek near beacon, –/9/1939, *Stokoe 7144* (BOL); Wildepaardeberg, Worcester Division (-DC), –/2/1936, *Stokoe s.n.* (BOL).

—3419 (Caledon): Galgeberg, Robertson Division (-BA), 4 300 ft., 23/3/1972, *Williams 1630* (NBG).

—3320 (Montagu): Pypsteelfontein, Waboomsberg, Montagu Division (-CA), 4 400 ft., 5/2/1975, *Williams 1968* (NBG); Leeuwrivierberg, Swellendam Division (-CD), 5 300 ft., –/4/1941, *Stokoe s.n.* (SAM *59377*, BOL); Anysberg, rocky summit, Laingsberg/Ladismith Division (-DA), 21/5/1950, *Esterhuysen 17065*.

—3321 (Ladismith): Towerkop, Swartbergen, Ladismith Division (-AC), 7 200 ft., 5/9/1947, *Esterhuysen 13933* (BOL); Swartberg above Kliphuisvlei summit ridge (-BD), 1 980 m, 1/1/1975, *Oliver 5527* (STE); Seven Weeks Poort Mountain (-AD), 6 000-7 600ft., 21/8/1956, *Wurts 1470* (NBG), 2 300 m, 26/12/1928, *Andreae 1188* (PRE), 7 600 ft., 30/3/1959, *Esterhuysen 28273* (BOL).

—3322 (Oudtshoorn): Swartberg Pass, rocky summit of range (-AC), 5 800 ft., 29/1/1961, *Esterhuysen 28829* (BOL), 6 000 ft., 25/1/1941, *Esterhuysen 4512* (BOL, GRA, SAM).

Without precise locality: *Roxburgh 14* (BM), *Niven 17* (BM, GOET), *Wallich s.n.* (BM, G, BOL, K, PRE), *Diosma ferulacea Kew 1815* (GOET).

Distribution and Variation

Acmadenia teretifolia is found only at very high altitudes, right up to and often on the summits of the highest peaks. Its known distribution extends from the Krakadouwsberg in the north near Clanwilliam more or less due south to the Drakenstein Mountains in the south and in an easterly direction more or less in line with Ceres to the vicinity of the Swartberg Pass near Oudtshoorn.

Although Sonder (1860) recognised a more glabrous plant at varietal level this difference with all the evidence now to hand cannot be upheld. Some variation in leaf size has been noticed, particularly in the thickness of the leaves and some populations from the Swartberg area appear to have smaller leaves.

Acmadenia teretifolia is readily recognised as distinct on account of having sub-terete leaves rounded at the apex and narrowing abruptly below to a slender petiole. It is perhaps nearest to *A. matroosbergensis* which however has leaves oblong-linear, sub-acute, sessile and very variable in size.

8. Acmadenia matroosbergensis Phillips in Jl S. Afr. Bot. **9** (3): 137 (1943). Type: Cape Province: Matroosberg, 1 900 m, 30/9/1924, *Marloth 7949* (BOL, lectotype; PRE, STE, isotypes).

Diosma marlothii Dümmer in Ann. Bol. Herb. **3**(1): 1 (1921). Type: Cape Province: probably on the Matroosberg, *R. Marloth 7949* (Herb. Marloth).

Icon: M. M. Page in Ann. Bol. Herb. **3**(1): 66, plate 1, D (1921).

Shrubs up to 0,6 m tall, single-stemmed at base. *Leaves* to 8,5 mm long, 1,5 mm broad, very variable in size, oblong linear, sub-acute, mucronate, glabrous, erect, usually opposite, decussate; adaxial surface concave; abaxial surface rounded, gland dots scattered; margins scabrid. *Inflorescence* terminal in pairs, sessile, stands open, pink, 12 mm diam. *Bract* somewhat leaf-like. *Bracteoles* two, 1,8 mm long, 1 mm broad, elliptic, glabrous, sessile with a few gland dots; apex with a small obtuse point; margins translucent, ciliolate. *Calyx lobes* five, 3 mm long, 1,5 mm broad, oblong-lanceolate, obtuse, glabrous, gland-dotted in two rows; margins translucent, ciliolate. *Petals* five, 6,5 mm long, 3,2 mm broad, ob-ovoid, narrowing evenly to the base, gland-dotted, glabrous, minutely and sparsely ciliolate, spreading widely and recurved. *Staminodes* five, 0,5 mm long, with a minute, pale, acute apical gland, reddened, glabrous. *Filaments* five, 1,1 mm long acicular, reddened, glabrous. *Anthers* five, 0,7 mm diam., dark maroon in colour;

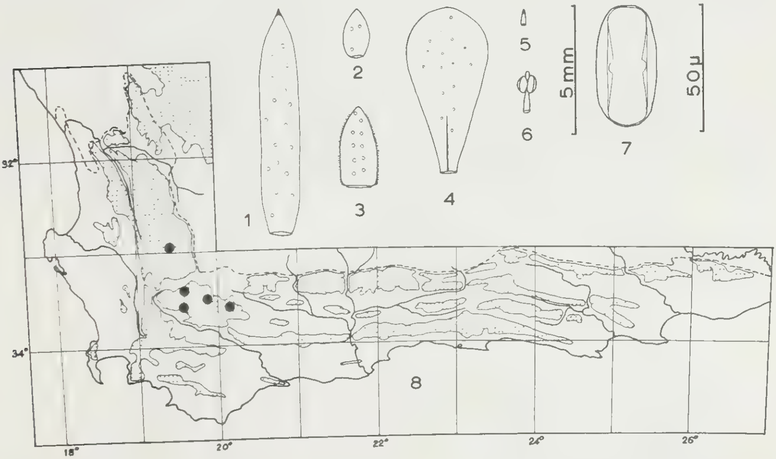

FIG. 10.
Acmadenia matroosbergensis: 1, leaf. 2, bracteole. 3, calyx lobe. 4, petal. 5, staminode. 6, anther. 7, pollen. 8, distribution.

apical gland 0,3 mm diam., acute, sticky. *Pollen* 47 μ long, 23 μ broad, oblong. *Disc* exceeding the ovary and folding slightly over it, turgid, dark red, exuding nectar. *Stigma* 0,4 mm diam., capitate, dark red. *Style* becoming 1 mm long, erect, glabrous, reddened. *Ovary* 5-carpellate, 1 mm diam., glabrous; apices globose, turgid. *Fruit* 6,5 mm long, 7,5 mm diam., glabrous, hornless, multi-gland-dotted, with an immersed gland at the apex of each carpel. *Seed* 4,5 mm long, 2,2–2,4 mm broad, black, shining, rather more pointed at one end than usual; aril white.

Dümmer stated that his description was based on five specimens in Dr Marloth's Herbarium, without exact particulars as to place or date of collection. However, a duplicate in the National Herbarium at Pretoria gives the locality altitude and date of collection and these have been given above. The specimen at the Bolus Herbarium having most likely been seen by Dümmer has been chosen as the lectotype. The above description amplifies that previously given.

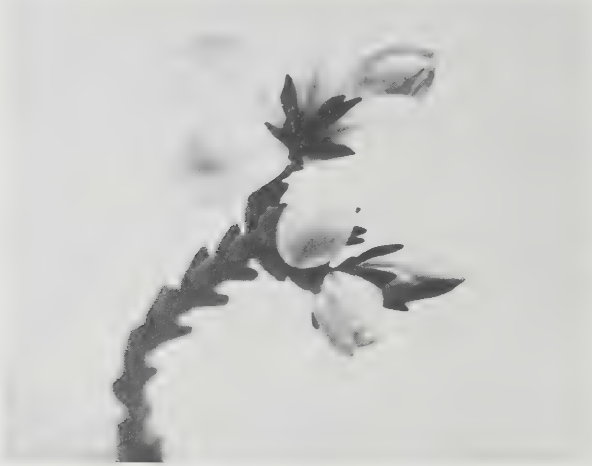

FIG. 11.
Acmadenia matroosbergensis: flower and flower bud.

SPECIMENS EXAMINED

CAPE—3219 (Wupperthal): Schurweberg, Cold Bokkeveld, Ceres Division (-CD), 4 000-4 500 ft., 11/10/1952, *Esterhuysen 20622* (BOL, K, LD, NBG), 4 800-4 950 ft., 8/12/1976, *Williams 2257* (NBG); Schurweberg, above Excelsio, 4 500 ft., 5/8/1971, *Esterhuysen 32615* (BOL).
—3319 (Worcester): Matroosberg (-BC), 1 900 m, 2/10/1899, *Marloth 7949* (BOL,

PRE, STE); Keeromsberg, Worcester Division (-DA), 4 000-5 000 ft., 7/11/1943, *Esterhuysen 9231* (BOL, K, NBG, SAM), 5/9/1965, *Taylor 6445* (K, PRE, STE); Kavadows Mountains, near Orchard, 4 000 ft., 23/11/1944, *Esterhuysen 10873* (BOL); Blaauwkop near Keeromsberg, 4 000-4 500 ft., 16/12/1951, *Esterhuysen 19636* (BOL); Ben Heatlie, summit, 6 600 ft., 8/11/1943, *Esterhuysen 9202* (BOL); Sawedge Peak, Worcester/ Montagu Division, 5 000 ft., 17/4/1954, *Esterhuysen 22847* (BOL), 5 000 ft., 22/10/1976, *Rourke 1597* (NBG), ± 4 000 ft., 6/9/1965, *Esterhuysen 31148* (BOL); Rabiesberg Kloof, Worcester Division, –/9/1935, *Walgate s.n.* (BOL); Dry elevated places, Wilde River (near Rabiesberg), *Niven B* (BM); Middelberg between Koo and Matroosfontein, Montagu Division (-DB), 4 000 ft., 24/8/1977, *Williams 2343* (NBG).

—3320 (Montagu): on road to Pypsteelfontein, Waboomsberg, Montagu Division (-CA), 4 200 ft., 28/5/1975, *Williams 2005* (NBG); Waboomsberg, west of Pypsteelfontein, c. 4 300 ft., 10/6/1971, *Kruger 1333* (STE); Highlands, 3,5 miles west of Ouberg Pass Summit, Montagu Division, 3 800 ft., 23/8/1977, *Williams 2340* (NBG).

Without precise locality: Elevated stony places, Breede River, *Niven A* (BM).

Distribution and Variation

Acmadenia matroosbergensis is found growing only at very high altitudes in dry rocky places on the mountains of the Montagu, Worcester and Ceres Divisions.

A certain amount of variation has been observed in the size of the leaves. Plant populations with large leaves are found on the Schurweberg in the Cold Bokkeveld and populations of plants with very small leaves occur at the opposite end of the distribution range on the Waboomsberg in the Montagu Division. Those populations with roughly intermediate leaves being found in between.

Of those species of *Acmadenia* with the flower standing open, *A. matroosbergensis* is recognised as distinct, having pink flowers with glabrous obovate petals narrowing evenly to the base, with staminodes 0,5 mm long, acute, with an acute gland on the anther, with pointed buds, having leaves oblong-linear, acute, glabrous, and having fruits without horns. It is nearest to *A. argillophila* which however has petals with a short claw and globose buds. It differs from *A. teretifolia* with terete leaves; from *A. tetracarpellata* with a 4-carpellate ovary; from *A. patentifolia* with horned fruits.

9. Acmadenia argillophila Williams in Jl S. Bot. **45**(2): 160 (1979). Type: CAPE—3320 (Montagu): Boesmansgat Quarry, 9 km east of Jan de Boers, Worcester/Laingsburg Division (-AC), 1 006 m (3 300 ft.), 3/8/1977, *Williams 2318* (NBG, holotype; BOL, K, MO, PRE, isotypes).

Acmadenia argillophila with its branches forked at 90°, small thick sessile leaves, lilac flowers 10 mm diam., orbicular petals short-clawed and spreading and with its 5-carpellate globose hornless fruit, is a distinct species. It differs from *A. teretifolia* with terete leaves; from *A. tetracarpellata* with a

4-carpellate ovary; from *A. patentifolia* with white flowers and horned fruits; from *A. fruticosa* with petiolate leaves and petals bulged inwards at the throat. It is closest to *A. matroosbergensis* which has branchlets densely puberulous; *leaves* which may be much larger, erect and sparsely ciliolate; *buds* more acute; *petals* narrowing evenly to the base with many more gland dots; *disc* exceeding the ovary, closing slightly over it; and staminodes 0,5 mm long, reddened with a minute pointed gland at the apex.

10. Acmadenia patentifolia Williams in Jl S. Afr. Bot. **44**(4): 343 (1978). Type: CAPE—3219 (Wupperthal): on track from Krom River to Breekkrantz, South Cedarberg, Clanwilliam Division (-CB), 914 m (3 000 ft.), 18/9/1975, *Williams 2087* (NBG, holotype; K, MO, M, PRE, STE, isotypes).

Acmadenia patentifolia is recognised as distinct on account of having very small, thick alternate leaves, small open flowers and a large fruit with long horns. It looks rather like *A. tetracarpellata* which however has somewhat thinner, opposite leaves and a 4-carpellate fruit.

11. Acmadenia tetracarpellata Williams in Jl S. Afr. Bot. **41**(4): 247 (1975). Type: CAPE—3219 (Wupperthal): in sandy soil below small cliffs, Groenfontein, Swartruggens, Ceres Division (-DC), 1 220 m (4 000 ft.), 20/11/1974, *Williams 1928* (NBG, holotype; BOL, K, M, MO, PRE, S, STE, isotypes).

Acmadenia tetracarpellata is recognised as distinct on account of its having extremely small open flowers and being the only plant in the genus with a 4-carpellate ovary except for *A. nivea* which however is a much smaller slender plant with small flowers with the petals bulged inwards at the throat and a 3 or 4-carpellate ovary.

4. ACMADENIA sectio **GLANDULA** Williams, sect. nova. propria propter florem petalis ad fauce approximatis gynoecio plus minusue occulto et antherum glandula apicala coronata.

Section *Glandula* is distinguished by having the flower with petals close together at the throat, more or less concealing the gynoecium and with the anther bearing a small apical gland.

Contains species:

12. *A. fruticosa*
13. *A. burchellii*
14. *A. trigona*
15. *A. latifolia*
16. *A. laxa*
17. *A. alternifolia*
18. *A. kiwanensis*

19. *A. densifolia*
20. *A. mundiana*
21. *A. obtusata*
22. *A. maculata*

12. Acmadenia fruticosa Williams in Jl S. Afr. Bot. **41**(4): 243 (1975). Type: CAPE—3321 (Ladismith): on the south side of road at the summit of Bosluiskloof Pass, Laingsburg Division (-AD), 1140 m (3 750 ft.), 12/7/1974, *Williams 1908* (NBG, holotype; C, GRA, K, M, MO, PRE, S, STE, isotypes).

Acmadenia fruticosa is recognised as distinct because of having small elliptic leaves and smallish pale pink flowers 10 mm diam. Several other species of *Acmadenia*, namely *A. laxa, A. macropetala, A. nivenii, A. obtusata, A. sheilae* and *A. tetragona* have a similar arrangement of opposite leaves and obvallate bracts at the base of the fruit. By the shape of their leaves they are all however easily seen as distinct from *A. fruticosa*.

13. Acmadenia burchellii Dümmer in Fedde Repert. **11**: 164 (1912). Type: CAPE—3321 (Ladismith): In the ascent up and near the summit of

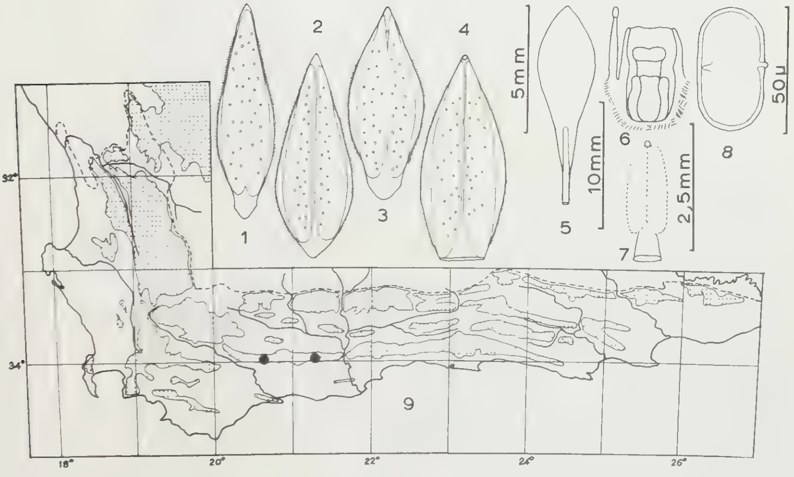

FIG. 12.
Acmadenia burchellii: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, gynoecium. 7, probable shape of anther before anthesis. 8, pollen. 9, distribution.

the great mountain at Mountain Station at Valley River Port, Riversdale Division (-CD), 9/12/1814, *Burchell 7096* (K, lectotype).

Shrubs about 0,3 m tall. *Branches* slender, fairly straight; bark dark brown, somewhat roughened with sloping leaf scars. *Branchlets* fairly numerous, erect, slender, straight, glabrous, leafy, angular when dried with a sharp ridge decurrent from each leaf base. *Leaves* 6–8 mm long, on younger plants up to 10 mm long, 1,4–1,6 mm broad on one side, complicate when dry, lanceolate, acute, glabrous, sub-sessile, erect, imbricate, opposite, apex with a small mucro hooked inwards; margins ciliolate, broadly translucent; adaxial surface pubescent towards the apex; abaxial surface glabrous, gland dots scattered. *Bracts* two, opposite, 8 mm long, 3 mm broad, lanceolate-elliptic, acute, sessile; apex with a small callus, sacculate, adaxially pubescent; margins ciliolate, broadly translucent; abaxial surface glabrous, sharply ridged, minutely gland-dotted, rather more remote from the bracteoles than usual. *Bracteoles* two, 7 mm long, 3 mm broad, elliptic-lanceolate, acute, sessile; apex with a small callus, sacculate, pubescent inside; margins ciliolate, broadly translucent; abaxial surface glabrous, sharply ridged, minutely gland-dotted. *Calyx lobes* five, 8 mm long, 2,6–3,2 mm broad, elliptic-lanceolate, acute; apex with a small callus, somewhat sacculate, pubescent inside; margins ciliate, broadly translucent; abaxial surface glabrous with many small gland dots. *Petals* five, 14–15,5 mm long overall, glabrous; *limb* 8,5 mm long, 4–4,5 mm broad, elliptic, acute with small scattered gland dots, brilliant pink, spreading; *claw* 7 mm long, 1,5 mm broad above, 0,7 mm broad below, midrib prominent. *Staminodes* five, 1,3 mm long, 0,33 mm broad below, tapering, apex glandular, glabrous, purplish. *Filaments* five, becoming 1,8 mm long, acicular, glabrous, purplish. *Anthers* 1,8 mm long, 0,8 mm broad; apical gland minute, sessile, globose. *Pollen* 49 μ long, 26 μ broad, oblong. *Disc* obvallate, narrow, exceeds the ovary and stigma by a long way at first. *Stigma* 0,6 mm diam., capitate, depressed globose. *Style* becoming 1,7 mm long, glabrous, rather stout. *Ovary* 5-carpellate, 0,9 mm long, 0,8 mm diam., glabrous; apices globose, somewhat retuse. *Fruit* 5-carpellate, 7 mm long, 5,5 mm diam., glabrous, very few gland dots, remaining more or less hidden within the persistent calyx lobes; horns reduced to a mere point, erect, less than 1 mm long. *Seed* about 4 mm long, black, shining; aril small, white.

Burchell's collections were only acquired by Kew in 1865 and so did not receive the attention of Sonder when he revised the *Diosmeae* for the *Flora Capensis* in 1860. It remained for Dümmer to describe this plant almost one hundred years after its discovery. The above description amplifying that given by Dümmer is based on *Rourke 301* from the north side of the Kampscheberg, near the beacon, growing among large sandstone rocks, petals a brilliant pink, only a few plants seen.

SPECIMENS EXAMINED

CAPE—3320 (Montagu): in saxosis, Langebergen pr. Zuurbraak, Swellendam Division (-DC), 2 000 ft., 23/1/1893, *Schlechter 2155* (BOL).

—3321 (Ladismith): in the ascent up and near the summit of the great mountain at Mountain Station at Valley River Poort, Riversdale Division (-CD), 9/12/1814, *Burchell 7096* (K); summit of Kampscheberg, north side near the beacon, 4 500 ft., 24/1/1966, *Rourke 301* (NBG); Kampscheberg, 3–4 000 ft., –/10/1926, *Thorne s.n.* (SAM *38972*); summit of Langebergen at Riversdale, 4 000 ft., 19/5/1950, *Esterhuysen 17024* (BOL, K).

Acmadenia burchellii is recognised as distinct having staminodes 1,3 mm long, anthers with a minute sessile apical gland, having bracts, calyx and petals relatively very large with petals glabrous and the disc narrow, exceeding the ovary by a long way. Of those plants with leaves opposite and lanceolate *A. burchellii* differs as follows: *A. densifolia, A. baileyensis* and *A. obtusata* have some pubescence on their petals; *A. rupicola* has the anther with a large apical gland; *A. flaccida* has flowers in pairs and *A. trigona* has very much smaller bracts and larger leaves.

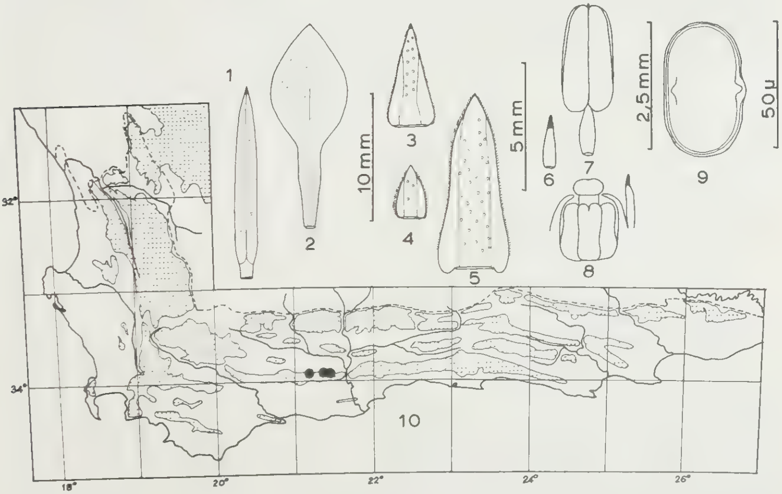

FIG. 13.

Acmadenia trigona: 1, leaf. 2, petal. 3, bracteole. 4, bract. 5, calyx lobe. 6, staminode. 7, anther. 8, gynoecium. 9, pollen. 10, distribution.

14. Acmadenia trigona (Eckl. & Zeyh.) Druce in Rep. botl Soc. Exch. Club Br. Isl. **1916**: 602 (1917). Type: In lateralibus montium (altit III) non procul a flumine Gauritzrivier prope villam Gideon Joubert terrae Cannaland (Swellendam); Oct. Nov. *Ecklon & Zeyher 792* (S, lectotype; MEL, SAM, isotypes).

Adenandra trigona Eckl. & Zeyh., Enum. Plant.: 100 (1835). Type: as above.

Acmadenia psilopetala Sonder in Fl. Cap. **1**: 380 (1860). Type: as above.

Shrubs 0,3–0,4 m tall, weak, semi-decumbent, single-stemmed at base. *Branches* few, slender, short, glabrous, smooth, bark brown, leaf scars not prominent. *Branchlets* slender, short, minutely puberulous, reddened, not much hidden by the leaves. *Leaves* 10–17 mm long, 1,5–2 mm broad, linear-lanceolate, acute, mucronate, glabrous, opposite, decussate, sub-imbricate or distant, erect or spreading, somewhat complicate when dry; margins narrowly cartilaginous, somewhat scabrid, villous-ciliate becoming eciliate; adaxial surface from convex to deeply canaliculate; abaxial surface rounded, midrib prominent, gland-dotted to either side; narrowed below to a short petiole. *Inflorescence* solitary, terminal and in the axils of the uppermost leaves, 20–27 mm diam., pink. *Bracts* on axial flowers, two, above two rudimentary leaves, 2 mm long, 1,2 mm broad, ovate or lanceolate, acute, ciliolate, sparsely pubescent adaxially, otherwise glabrous; margins broadly translucent, 1 or 2 gland dots near the midrib. Bracts on terminal flowers exactly like a pair of leaves 15 mm long with convex adaxial surface, villous ciliate. *Bracteoles* two, 3,5–5,9 mm long, 1,6–1,8 mm broad, lanceolate, acute with a red tip, glabrous, ciliolate or ciliate, margins translucent, 2 rows of gland dots along the midrib. *Calyx lobes* five, 6–7,5 mm long, 2,3–2,7 mm broad, lanceolate, acute, ciliate, adaxially thinly pubescent above, otherwise glabrous; abaxial surface rounded, multi-gland-dotted, shining, coloured; margins broadly translucent below. *Petals* five, 16 mm long overall; *limb* 10 mm long, 6 mm broad, elliptic, acute, apiculate, glabrous multi-gland-dotted on the underside, pink, spreading; *claw* 6 mm long, 1,8 mm broad, narrowing to the base, glabrous, bulged inwards at the throat closing the tube. *Staminodes* five, 1 mm long, glabrous, apex glandular acute. *Filaments* five, becoming 1,7 mm long, acicular, glabrous, incurved. *Anthers* five, 2,1 mm long, 1 mm broad, yellow; apical gland minute, pointed, about twice the size of a grain of pollen. *Pollen* 53 μ long, 31 μ diam., elliptic, turgid when fresh or 58 μ long, 25 μ diam., oblong, shrunken, possibly having been sucked out by a species of thrips. *Disc* dome-shaped, closes over the ovary to meet the stigma, not shining, pale green, exudes nectar at base of filament. *Stigma* 0,6 mm diam., capitate, pale green. *Style* becoming 1,5 mm long, glabrous, erect. *Ovary* 5-carpellate, 1,1–1,3 mm long, 1–1,1 mm diam., glabrous, apices emarginate. *Fruit* 5-carpellate, 7 mm long, 4,5 mm diam., entirely surrounded by the persistent calyx lobes, glabrous, gland-dotted mainly towards the margins; *horns* ± 1 mm long, erect, emarginate *Seed* 5 mm long including the white aril, 1,8 mm broad, black, shining.

Ecklon and Zeyher, as was usual, no doubt distributed duplicates of this species to many herbaria. It follows that there are probably several isotypes preserved in other herbaria under *Adenandra trigona* which, having not been seen by the present writer, are not here cited. The above description, done from fresh material, amplifies those previously given.

SPECIMENS EXAMINED

CAPE—3321 (Ladismith): top of Garcias Pass, Riversdale Division (-CC), 14/9/1937, *Salter 6907* (BM, K); Garcias Pass near Toll House, 1 000 ft., 7/10/1897, *Galpin 3845* (BOL, GRA, PRE); inter restiones in declivibus saxosis, Garcias Pass, 1 400 ft., –/10/1904, *H. Bolus 11236* (BOL, K); lower north slopes of Langebergen above Garcias Pass, 15/5/1950, *Esterhuysen 16990* (BOL, K, LD, NBG), –/11/1913, *Muir 1254* (BOL), 4/8/1976, *Goldblatt 3765* (MO); Garcia Forest Station, slopes in kloof, 25/5/1950, *Esterhuysen 17248* (BOL, NBG), –/11/1949, *Stokoe s.n.* (SAM *64180*); Garcias Pass, 1 400 ft., –/10/1923, *Muir s.n.* (GRA), –/9/1908, *Phillips 327* (K, SAM, STE,), 1 200 ft., 5/4/1926, *Smith 2760* (K, PRE), *L. Bolus s.n.* (K), 5/8/1951, *Barker 7367* (NBG), 6/4/1959, *Barker 8950* (NBG), 1 800 ft., 23/9/1949, *Acocks 15426* (PRE), 1 000–2 000 ft., –/10/1926, *Thorne s.n.* (SAM *38851*); Ad lat. mont. pone Gauritz River, Swellendam, (-CD), -/10/-, *Zeyher s.n.* (SAM *14250*); in lateralibus montium (altit. III) non procul a flumine Gauritzrivier prope villam Gideon Joubert terrae Cannaland (Swellendam), Oct. Nov., *Ecklon & Zeyher 792* (S, MEL); at Groot Waterfal, north slopes of Langeberg, between Muiskraal and Cloetes Pass, 1 450 ft., 5/5/1972, *Rourke 1340* (NBG); Rietvlei, north side of Langeberg, 1 300 ft., 3/11/1975, *Williams 2140* (NBG).

DISTRIBUTION AND VARIATION

Acmadenia trigona is found on north-facing dry rocky slopes of the Langeberg from Garcias Pass to near Rietvlei which lies about 25 km to the east of Garcias Pass. No appreciable variation has been noticed.

Of those species of *Acmadenia* in which the throat is closed, *A. trigona* is recognised as distinct having the staminodes 1 mm long with a pointed gland at the apex and the apical gland on the anther absolutely minute and acute, also having leaves opposite, linear-lanceolate, acute, villous-ciliate, glabrous, having petals glabrous at the throat, the disc closing over the ovary and the seed with a white aril. It differs from *A. gracilis* which has smaller leaves, a relatively large pointed gland on the anther and petals pubescent at the throat; from *A. latifolia* which has much broader leaves and petals with the claw sparsely ciliolate; from *A. obtusata* which has smaller staminodes and a larger gland 0,4 mm long on the anther, leaves with margins scabrid-serrulate not villous-ciliate and petals with very few gland dots; from *A. densifolia* which has leaves crisped pubescent.

15. Acmadenia latifolia Williams, sp. nov. affinis *A. trigona* (Eckl. & Zeyh.) Druce sed foliis latioribus et unguis sparsim ciolatis differt.

Frutex 0,3–0,6 mm, semi decumbens, ad basim monocaulis. *Rami* flex-

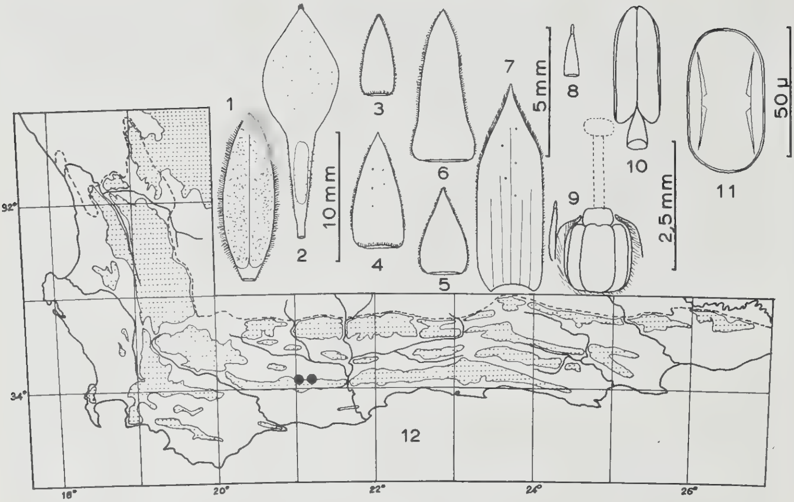

Fig. 14.
Acmadenia latifolia: 1, leaf flattened out. 2, petal. 3, first pair of bracts. 4, abaxial bract. 5, adaxial bract. 6, bracteole, 7, calyx lobe. 8, staminode. 9, gynoecium with disc and staminode. 10, anther. 11, pollen. 12, distribution.

uosi, laxiusculi, glabrescenti. *Ramuli* brevi, erectiusculi, pauci, pubescenti, foliosi. *Folia* 12,5–13,5 mm longa, 4 mm lata ubi expansa, lanceolato-elliptica, sub-acuta, mucronata, complicata, sessilia, opposita, decussata, sub-imbricato-erecta, margine villoso-ciliata anguste hyalina, pagina adaxialis profunde canaliculata glabra, pagina abaxialis multi-glanduloso-punctata forte costata. *Inflorescentia* terminalis vel axillaris, solitaria, sessilia. *Flos* 21 mm diam., rosea. *Bracteae* variantes. *Bracteolae* duae, 5,9 mm longae, 2,5 mm ad basim latae, sub-acutae, crispo-ciliatae, glabrae, glanduloso-punctatae. *Sepala* quinque, 8 mm longa, 2,5 mm lata, linearo-lanceolata, acuta, apex recurva, margine ciliata, pagina adaxialis minute puberula, pagina abaxialis glabra, glanduloso-punctata. *Petala* quinque, 18–19 mm longa in toto; *limbus* 10 mm longus, 6–6,8 mm latus, late lanceolatus, acutus, roseus, patens, glaber, glanduloso-punctatus; *unguis* 8 mm longus, 2 mm latus ad basim decrescens, glaber, glanduloso-punctatus, in medio minute ciliolatus. *Staminodia* quinque, 1,5 mm longa, glaber, glanduloso-coronata. *Fila* quinque, 1,5 mm longa, subulata, glabra. *Anthera* quinque, ante anthesin 2,3 mm longae, 0,9 mm latae, auriantiacae, glandula 0,1–0,15 mm longa coronata. *Pollen* 56 μ longum, 30 μ latum, oblongum. *Discus* viridus, ovarium inclusum, nectarifer. *Stigma* 0,6 mm diam., depresso-globosum. *Stylus*

fere 2 mm longus, glaber, erectus. *Ovarium* 5-carpellatum, 1,3 mm longum, 1,2 diam., glabrum, apicibus emarginatis. *Fructus* 5-carpellatus, 7 mm longus, 5,6 mm diam., glaber. *Cornua* 1,5 mm longa, erecta, emarginata, minute et sparsim setulosa. *Semen* 4,5 mm longum, 1,8 mm latum, piceum, nitens; arilus ex parte brunneolus.

Type: CAPE—3321 (Ladismith): Kanetberg, Gysmanshoek Pass, North side, Heidelberg Division (-CC), 760 mm (2 500 ft.), 17/10/1978, *Williams 2615* (NBG, holotype; BOL, PRE, MO, isotypes).

Shrubs 0,3–0,6 m tall, with few branches rising from a single stem at base. *Branches* short, rather lax, variously bent, glabrescent; bark dark brown, rough with leaf scars. *Branchlets* short, fairly erect, few, densely pubescent, reddish, well clothed with leaves. *Leaves* 12,5–13,5 mm long, 4 mm broad if pressed flat, lanceolate-elliptic, sub-acute, mucronate, complicate, sessile, opposite, decussate, sub-imbricate, erect; margins villous-ciliate mainly below, narrowly cartilaginous; adaxial surface glabrous, deeply grooved; abaxial surface prominently ribbed with gland dots scattered to either side. *Inflorescence* at first terminal then, on the same twig, crowded in three opposite pairs in the uppermost axils of the leaves; *flowers* 21 mm diam., solitary, sessile, pink. *Bracts* 2 pairs, varying in size depending on whether the flower is terminal or axial, 3,1–13 mm long, 1,3–2,5 mm broad, lanceolate, acute, ciliolate; adaxially pubescent except for the posterior bract; abaxially glabrous to thinly puberulous; anterior bract gland-dotted and green towards .the midrib above. *Bracteoles* two, 5,9–8,5 mm long, 2,5–2,8 mm broad, narrowing to the apex, acute, crisped ciliate mainly above, glabrous; midrib prominent, multicoloured, gland-dotted above; margins translucent below. *Calyx lobes* five, 8–9,5 mm long, 2,5–3 mm broad, lanceolate, acute, apex recurved, margins ciliate, densely so above; adaxial surface minutely puberulous mainly above; abaxial surface glabrous, gland-dotted and purplish above. *Petals* five, 18–19 mm long overall, soon falling; *limb* 10 mm long, 6–6,8 mm broad, broadly lanceolate, acute, glabrous, pink, spreading, abaxially gland-dotted, apex with a few hairs; *claw* bulged inwards at the throat, 7,5–8 mm long, 2–2,3 mm broad above narrowing below, glabrous, gland-dotted to either side, very sparsely ciliolate. *Staminodes* five, 1 mm long, 0,3 mm broad, pale, glabrous, tapering to a small pointed gland at the apex. *Filaments* five, becoming 1,5–2,3 mm long, subulate, glabrous. *Anthers* five, before anthesis 2,3 mm long, 0,9 mm broad, yellow with a minute (0,1–0,15 mm long) pointed apical gland inclined inwards. *Pollen* 56 μ long, 30 μ broad, oblong. *Disc* closes over the ovary at first touching the stigma, green, exudes nectar. *Stigma* 0,6 mm diam., depressed, globose, 5-lobed. *Style* becoming nearly 2 mm long, glabrous, erect, persisting. *Ovary* 5-carpellate, 1,3 mm long, 1,2 mm diam., glabrous, apices emarginate. *Fruit* 5-carpellate, 6,8–7 mm long, 5–5,7 mm diam., pale, glabrous below, margins gland-dotted, sparsely pubescent, closely surrounded by the persistent calyx lobes; *horns* 1,5 mm long, sparsely and minutely setulose, emarginate. *Seed* 4,5 mm long, 1,8 mm broad, black, shining; aril pale, partly light brown.

It would appear that this plant was first collected by E. E. Galpin in 1897 at Muiskraal near Garcias Pass on the north side of the Langeberg. Type material used in this description was collected at Gysmanshoek Pass which lies to the west of Muiskraal and is also on the north slopes of the Langeberg.

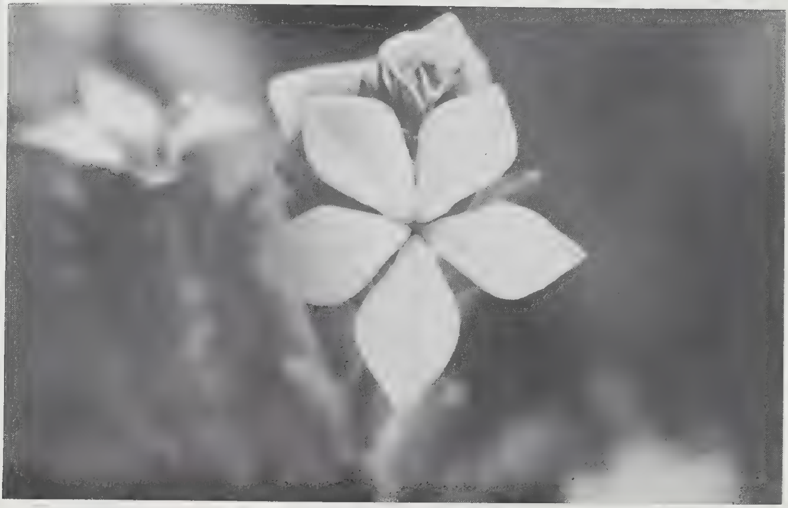

FIG. 15.
Acmadenia latifolia: flower showing the closed throat.

SPECIMENS EXAMINED

CAPE—3321 (Ladismith): Muiskraal near Garcias Pass, south side of ridge, Riversdale Division (-CC), 1 200 ft., 3/10/1897, *Galpin 3847* (BOL, GRA, PRE), 13/6/1961, *van Breda 1089* (PRE), 4/8/1976, *Goldblatt 3761* (MO); in planite summam partem viae inter Garcias Pass et Muiskraal, 1 800 ft., –/10/1904, *H. Bolus 11237* (BOL, GRA); north end of Garcias Pass, 2 000 ft., 23/9/1949, *Acocks 15431* (G, K, PRE); hills north of Garcias Pass, 2 000 ft., 3/11/1975, *Williams 2139* (NBG); Garcias Pass, –/10/1926, *Thorne s.n.* (SAM *38851*), 9/8/1949, *Barker 5520* (NBG), –/9/1908, *Phillips 372* (SAM); Kanetberg, Gysmanshoek Pass north side, Heidelberg Division, 2 500 ft., 17/10/1978, *Williams 2615* (NBG, BOL, PRE, MO); north side of Gysmanshoek Pass, 2 400 ft., 4/12/1978, *Williams 2656* (NBG, BOL, PRE, STE).

DISTRIBUTION

This species is very local. It is known only from two localities, one at Gysmanshoek Pass and the other at Muiskraal. They are 13 km apart.

Of those species of *Acmadenia* with opposite leaves and with the throat of the flower closed by the petals, *Acmadenia latifolia* is recognised as distinct having staminodes 1 mm long with a pointed gland at the apex and the apical gland on the anther absolutely minute, also having leaves lanceolate-elliptic, villous cilate, glabrous, having petals glabrous at the throat with the claw sparsely ciliolate, the disc closing over the ovary and the seed with the aril brownish on one side. It is most like *A. trigona* which however has petals with the claw eciliate and narrower leaves.

16. Acmadenia laxa Williams in Jl S. Afr. Bot. **40**(4): 283 (1974). Type: CAPE—3420 (Bredasdorp): Bontebok National Park, Swellendam (-AB), 110 m, 27/7/1973, *Williams 1828* (NBG, holotype; M, MO, PRE, S, STE, isotypes).

Acmadenia obtusata sensu Bartl. & Wendl. Diosm. in Beitr. Bot. **1**: 63 (1824).

Acmadenia muraltioides Eckl. var. *minor* Presl. nom. nud.

Acmadenia laxa is recognised as distinct on account of its having leaves that are opposite and obtuse, flowers solitary, with numerous pairs of bract-like leaves at the base of each, and anthers bearing a minute apical gland. It differs from *A. nivenii, A. macropetala* and *A. sheilae* which have the anther with a large pointed apical gland, and from *A. gracilis, A. obtusata* and *A. trigona* which have leaves acute.

17. Acmadenia alternifolia Chamisso in Linnaea **5**: 52 (1830). Type: C.B.S. ad Hangklipp, –/7/1821, *Mundt et Maire s.n.* (K, lectotype; E, P, G, S, isotypes).

Shrubs up to 1 m tall, single-stemmed at base, lower branches variously bent, bark very rough. One stem about 25 mm diam., showed about 50 annual growth rings. *Branches* short, slender, lax, puberulous, rough with leaf scars, dusky brown. *Branchlets* short, slender, clustered, somewhat erect, densely leafy, puberulous. *Leaves* 6,5–12 mm long overall, 1,3–2 mm broad, linear or linear-lanceolate, acute with a sharp mucro, crowded, alternate, fairly erect, incurved towards the apex; margins thinly cartilaginous. minutely scabrid; petiole 1,5–2 mm long, 0,7 mm broad, minutely pubescent; adaxial surface flat, concave when dry, dark green, scabrid; abaxial surface with the midrib prominent and scabrid, with a single row of gland dots to either side and a few along the margins. *Inflorescence* terminal, sessile, crowded, each flower on a very short branchlet. *Bract* 5 mm long in-

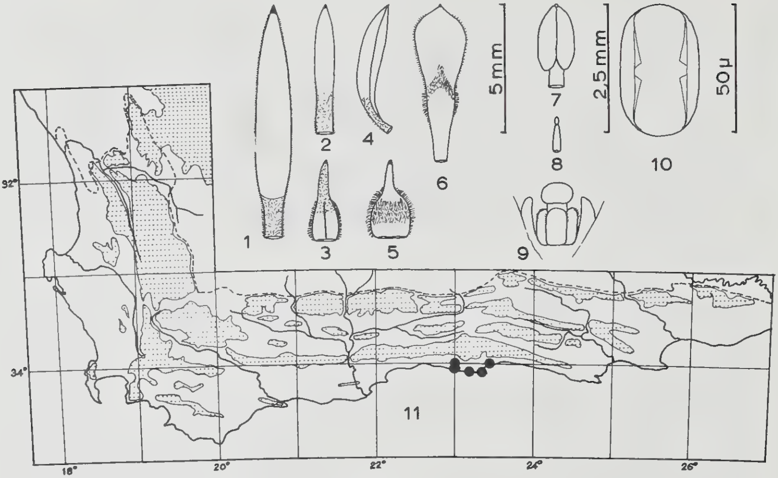

Fig. 16.
Acmadenia alternifolia: 1, leaf. 2, bract. 3, bracteole. 4, side view of bract. 5, calyx lobe viewed from inside. 6, petal. 7, anther. 8, staminode. 9, gynoecium. 10, pollen. 11, distribution.

cluding the pubescent petiole, 1,5 mm long, 0,8 mm broad, tumid, incurved, linear, acute, minutely mucronate, scabrid. *Bracteoles* up to five, the innermost about 3 mm long, 1 mm broad, translucent and ciliate below, narrowing above to a tumid scabrid awl-shaped point, adaxially pubescent towards the base. *Calyx lobes* five, 3 mm long, 1,5 mm broad translucent and crisped ciliate below, apiculate and scabrid above; apex mucronate, spreading, adaxially adpressed pubescent about the middle. *Petals* five, 6 mm long overall; *limb* 2–2,7 mm broad, apiculate, sparsely ciliolate, without gland dots, spreading; *claw* about 3 mm long, 1,1 mm broad, ciliate, somewhat pubescent and projecting inwards at the throat. *Staminodes* five, 0,7 mm long, glandular at the apex, glabrous. *Filaments* five, becoming 2,3 mm long, acicular, glabrous. *Anthers* five, before anthesis 1,3 mm long, 0,7 mm broad, yellow, apical gland minute. *Pollen* 51 μ long, 31 μ diam., ellipsoid. *Disc* exceeds the ovary, obvallate, green, exudes nectar. *Stigma* 0,5 mm diam., capitate, globose. *Style* 1 mm long, terete, glabrous, erect. *Ovary* 5-carpellate, 0,8 mm diam., glabrous, green. *Fruit* 5-carpellate, 12 mm long, sparsely puberulous with a few gland dots at the sides otherwise glabrous; *horns* 4 mm long, slightly incurved, with an immersed gland at the apex. *Seed* 5 mm long, 2,2 mm broad, black, shining; aril small, black on one side.

It has not been found possible to trace the locality "Hangklipp" given by

Munt & Maire. As this plant has been found in exposed positions on dry cliffs near the coast from Knysna to Plettenberg Bay, this name must refer to a prominence somewhere in this area. In *Linnaea* under *Rutaceae* it states quite plainly that Adelberto de Chamisso is the sole author. The name of von Schlechtendal should therefore not be attached to this species. The above description done from fresh material may possibly amplify that previously given by Chamisso.

SPECIMENS EXAMINED

CAPE—3323 (Willowmore): Klein Gouna Plateau, steep dry slopes of Knysna River, Knysna Division (-CC), 500 ft., –/7/1921, *Keet s.n.* (STE *13757*); Keurbooms River, low stony hills near river mouth (-CD), 8/11/1928, *Gillett 2215* (BOL); Knysna, Matjiesfontein (old road at Keurbooms River), 500 ft., –/11/1928, *Fourcade 4168* (BOL–FOURC).

—3422 (Mossel Bay): Phantom Pass on steep rocky north slope (-BB ?), –/9/1922, *Keet 1036* (GRA).

—3423 (Knysna): At Zandkraal on the western side of the Knysna drift, near the foot road (-AA ?), 13/7/1814, *Burchell 5532* (BOL, G, K, MEL, P, S, W); Harkerville Forest Reserve, above Stevens Bank, 520 ft., 5/7/1973, *Williams 1820* (NBG); C.B.S. found near Plettenberg Bay (-AB), *Bowie s.n.* (BM); Plettenberg Bay Reserve, hill slopes above coast, 11/5/1961, *Lewis 5768* (NBG); Vyekraal, Plettenberg Bay, Knysna Division, 200 ft., 5/7/1973, *Williams 1819* (NBG).

DISTRIBUTION

Acmadenia alternifolia appears to be fairly local, so far having been found only in an area near to and along the coast from the Knysna River to the Keurbooms River. No variation has been noticed.

Acmadenia alternifolia is recognised as distinct having staminodes 0,7 mm long and anthers with a minute apical gland, having leaves linear-lanceolate, incurved acute, keeled with two rows of gland dots, margins minutely scabrid and having fruits with horns about 4 mm long. Only three other species of *Acmadenia* have fruits with long horns and from these *A. alternifolia* differs as follows: *A. flaccida* has opposite leaves; *A. patentifolia* has very small thick sessile leaves; *A. tenax* has the style deflexed at some stage.

18. Acmadenia kiwanensis Williams in Jl S. Afr. Bot. **44**(4): 347 (1978). Type: CAPE—3327 (Peddie): on right hand side of road to Kiwane, 2,6 km from main Peddie/East London road (-BA), 122 m (400 ft.), 9/3/1976, *Williams 2175* (NBG, holotype; BOL, GRA, K, MO, NSW, PRE, S, isotypes).

Acmadenia kiwanensis is recognised as distinct on account of having leaves alternate, lanceolate, acute, puberulous with the tips pale and minutely bristly and in having fruits somewhat pubescent with fairly short horns and imbricated only towards the base by the calyx lobes. Geographically the nearest species is *A. obtusata* which has leaves nearly always opposite, with bracts and bracteoles apiculate and with fruits glabrous, short horned and more or less hidden by the calyx lobes. Still further away, *A. alternifolia* can be distinguished by its fruits with much longer horns.

19. Acmadenia densifolia Sonder in Fl. Cap. **1**: 380 (1860). Type: CAPE—3421 (Riversdale): Hoëkraal, between Kafferkuils river and Zoetmelks river on limestone hills, Riversdale Division (-AB), 500–1 000 ft., (IV, C, a, 3), 17/8/1831, *Drège 7145* (S, holotype; P, isotype).

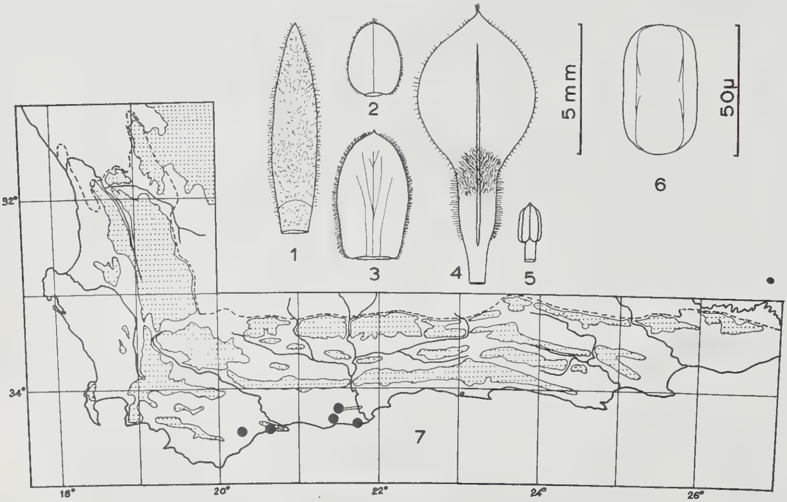

FIG. 17.
Acmadenia densifolia: 1, leaf. 2, bracteole. 3, calyx lobe. 4, petal. 5, anther. 6, pollen. 7, distribution.

Shrubs up to 0,6 m tall, single-stemmed at base. *Branches* fairly erect, slender, short, glabrescent, the bark fairly smooth. *Branchlets* short, slender, erect, densely crisped pubescent, well clothed with leaves. *Leaves* 7–12 mm long, 1,7–2,3 mm broad, lanceolate, acute, somewhat complicate, usually alternate, imbricate, adpressed erect; apex rubro-mucronate, somewhat incurved; margins narrowly translucent, crisped ciliate; petiole broad, very short; adaxial surface glabrous; abaxial surface crisped pubescent mainly along the proment midrib, gland-dotted between midrib and margins. *Inflorescence* solitary at the ends of short branchlets or almost axial in groups at the ends of branchlets, upper or involucral leaves becoming bract-like; *flowers* 12 mm diam., pink or pale purple in colour. *Bracteoles* two, 2,8 mm long, 2 mm broad, ovate, ciliolate, apex minutely tufted, glabrous, midrib green. *Calyx lobes* five, 5 mm long, 2,7 mm broad, oblong, obtuse, apiculate, ciliate, distinctly veined; adaxial surface sparsely pubescent towards the centre; abaxial surface glabrous, purplish towards the apex. *Petals* five, 10,5 mm long; *limb* 6,5 mm long, 4,5 mm broad, orbicular, apiculate, sparsely ciliate, upper surface sparsely puberulous; *claw* 4 mm long, 1,5 mm broad above narrowing to 0,6 mm below, densely bearded on the "chin" at the throat, ciliate, margins translucent. *Staminodes* five, 0,15 mm long, 0,1 mm diam., ovoid. *Filaments* five, becoming 1,8 mm long, acicular, glabrous. *Anthers* five, before anthesis 1,5 mm long, 0,9 mm broad, yellow, apical gland 0,1 mm long, ovoid. *Pollen* 50 μ long, 28 μ broad, oblong. *Stigma* 0,7 mm diam., globose, capitate, dark green. *Style* becoming 1,6 mm long, erect, glabrous. *Ovary* 5-carpellate, 1 mm diam.; carpels very sparsely pubescent at the sides, apices glabrous somewhat emarginate towards the inside. *Fruit* (immature) 5-carpellate, carpels smooth, without gland dots, very sparsely pubescent on the margins above; *horns* emarginate, very short. *Seed* (from *Esterhuysen 19528)* 3,4 mm long, 1,3 mm broad, black, shining.

The holotype seen by Sonder is preserved in his herbarium at Stockholm. The locality given by Sonder in *Flora Capensis* is in error due to a misprint in Drège's *Documente* page 161 where *Acmadenia 7145* printed as IV, C, c, 3 should read IV, C, a, 3 as it appears on page 123 earlier in the text. An examination of the label on the specimen in Drège's herbarium preserved at Paris reveals yet another error in that the correct altitude is stated as being 500–1 000 ft., not below 500 ft. as in the text of Drège's *Documente*. Taking these errors into consideration it was comparatively easy to rediscover this plant in its type locality. The above description done from fresh material amplifies that previously given by Sonder.

Specimens Examined

CAPE—3420 (Bredasdorp): Vanderstelskraal, summit of limestone hills, Bredasdorp Division (-AC), 450 ft., 2/7/1972, *Williams 1663* (NBG), 500 ft., 1/8/1968, *Acocks 24046* (K); Melkkamer farm, upper S. slopes of limestone hills at Wolfkloof 6 km from De Hoop Vlei, 100 m alt., 18/9/1979, *Burgers 2289* (CPA Nat. Cons. Herb.); Lekkerwater farm, limestone hills between Potberg and the sea, Bredasdorp Division (-BC), 8/9/1973, *Powrie 263* (BOL); Potberg, Hamerkop, near track turning off to the coast, 170 m alt., 28/5/1980, *Burgers 2381* (CPA Nat. Cons. Herb.).
—3421 (Riversdale): near Askop, S. side of main road 10 miles W. of Albertinia Riversdale Division (-AB), 600 ft., 2/3/1974, *Williams 1880* (NBG); Hoëkraal between Kafferkuils river and Zoetmelks river on limestone hills, 500–1 000 ft., (IV, C, a, 3), 17/8/1831, *Drège 7145* (P, S); rocky ridges at Droëvlakte, Riversdale Division (-AD), –/9/1913, *Muir 1091* (BOL); Melkhoutfontein, 600 ft., 7/10/1897, *Galpin 3846* (BOL, GRA); limestone hills along the road to Still Bay, 7/12/1951, *Esterhuysen*

19528 (BOL, K); Riethuiskraal off Still Bay road, 13/4/1962, *Lewis 5924* (NBG); Still Bay hills, 4/8/1951, *Johnson 111* (NBG); Buffelshoek near sea, in rocky places (-BC/BD), –/9/1913 *Muir 1104* (BOL, K).

DISTRIBUTION

Acmadenia densifolia is found growing on limestone hills belonging to the tertiary Bredasdorp beds between Bredasdorp and Albertinia.

It is recognised as distinct, having staminodes and the small gland on the anther ovoid and having leaves lanceolate, usually alternate, adpressed erect, the apex rubro-mucronate, incurved, margins crisped ciliate, the abaxial surface crisped pubescent mainly along the prominent midrib. It differs from other species of *Acmadenia* with lanceolate alternate leaves as follows: from *A. rupicola* which has large conical anther glands; from *A. obtusata* which has leaves glabrous; from *A. kiwanensis* and *A. tenax* which have leaf margins not crisped ciliate; from *A. wittebergensis* which has leaves round-backed without prominent midrib; from *A. alternifolia* which has fruits with long horns.

20. Acmadenia mundiana Ecklon & Zeyher, Enum. Plant.: 105 (1835). Type: In montium lateribus prope Swellendam, –/10/–, *Mundt s.n.* (SAM, lectotype; S, isotype).

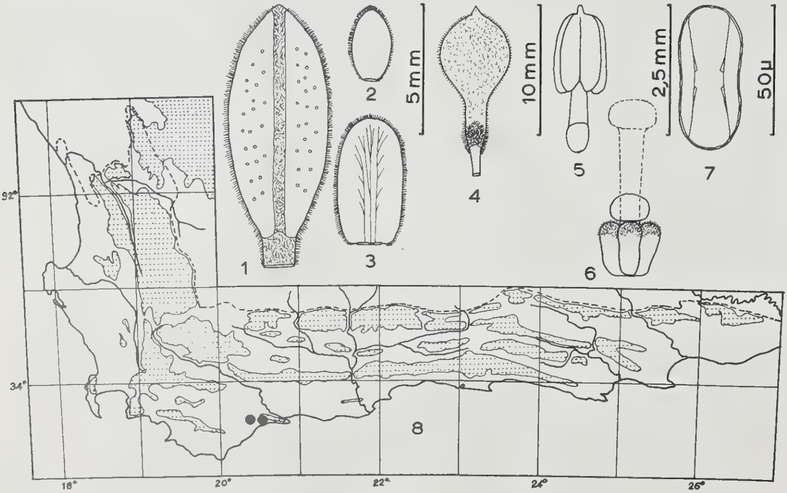

FIG. 18.
Acmadenia mundiana: 1, leaf. 2, bracteole. 3, calyx lobe. 4, petal. 5, anther. 6, gynoecium. 7, pollen. 8, distribution.

Acmadenia cucullata E. Meyer ex Sonder in Fl. Cap. **1**: 381 (1860). Type: Limestone hills between Cape Agulhas and Potberg, below 500 ft., (IV, C, a, 2), 3/8/1831, *Drège s.n.* (BM, G, K, MEL, P (*E. Meyer 3549),* PRE, S, W).

Acmadenia neglecta Dümmer in Fedde Repert. **11**: 120 (1912). Type: *Drège s.n.* (K).

Shrubs up to 1,2 m tall, well-branched, single-stemmed at base. *Branches* short, fairly erect, glabrescent. *Branchlets* short, erect, puberulous, densely leafy. *Leaves* up to 11 mm long, those of younger plants larger and more pubescent, 3,8–4,8 mm broad, elliptic, obtuse, petiolate, alternate; margins narrowly cartilaginous, scabrid, crisped ciliate when young; adaxial surface grooved down the middle, minutely puberulous; abaxial surface scabrid, often minutely puberulous, gland-dotted with the midrib prominent, scabrid, pubescent or shaggy pubescent. *Inflorescence* terminal, solitary, 15 mm diam., pink, closed at the throat. *Involucral leaves* much reduced, becoming bract-like. *Bracteoles* two, 2,7 mm long, 1,5 mm broad, elliptic, obtuse, concave, translucent, glabrous, ciliolate; apex soon withering. *Calyx lobes* five, 5–6 mm long, 2,5–3 mm broad, oblong, obtuse, pseudo-apiculate due to the inrolled margins and with a tuft of hairs, 3-veined, glabrous, ciliate, translucent, shining. *Petals* five, vary in size, 13 mm long; *limb* 7 mm long, 5,5 mm broad, orbicular, apiculate, thinly puberulous above, ciliolate; *claw* 6 mm long, 1,5 mm broad above, 0,8 mm broad below, ciliate and pubescent above, arched inwards almost closing the throat. *Staminodes* five, 0,2–0,4 mm long, fusiform, glabrous. *Filaments* five, becoming 2,4 mm long, acicular, glabrous. *Anthers* five, before anthesis 1,7–1,8 mm long overall, 1 mm broad, yellow; apical gland 0,2 mm long, sub-acute. *Pollen* 55 μ long, 24 μ diam., oblong. *Disc* obvallate, exceeds the ovary, green, quite fleshy, exudes nectar. *Stigma* 1 mm diam., globose, capitate. *Style* becoming 1,5–2,3 mm long, glabrous, erect. *Ovary* 5-carpellate, 1 mm long, 1,2 mm diam.; apices globose, puberulous, adaxially emarginate. *Fruit* 5-carpellate, 5 mm long, 4,5 mm diam., enclosed within the persistent calyx lobes; carpels glabrous, smooth, gland-dotted towards the margins; *horns* very short, 0,3 mm long, emarginate, echinulate. *Seed* 3,5–3,8 mm long, 1,5–1,6 mm broad, black, shining; aril black on one side.

The locality where *Acmadenia mundiana* is found lies 40 km south of Swellendam. But as Swellendam was the only landmark for many miles around, the locality given by Mund "on mountain slopes near Swellendam" is perhaps not too wide of the mark. As the whereabouts of the specimen actually seen by Ecklon & Zeyher is unknown, the fragment preserved in the herbarium of the South African Museum at Kirstenbosch has been chosen as the lectotype.

Specimens resembling *Acmadenia cucullata*, other than those collected by Drège, had not been seen in any herbarium nor had any been observed in the field until Mr. C. Burgers of the Department of Nature Conservation in 1979 discovered a hybrid swarm, near De Hoop Vlei, of plants grading from *Acmadenia obtusata* (Thunb.) Bartl. & Wendl. to *Acmadenia mundiana* Eckl. & Zeyh. Amongst these were populations of plants resembling Drège's collection of *Acmadenia cucullata*.

The above description done from fresh material amplifies those previously given.

Specimens Examined

CAPE—3420 (Bredasdorp): Limestone hills between Cape Agulhas and Potberg (-AD), below 500 ft., (IV, C, a, 2), 3/9/1931, *Drège s.n.* (BM, G, K, MEL, P *(E. Meyer 3549)*, PRE, S, W); De Hoop, limestone hills, 8/4/1957, *Barker 8683* (BOL, NBG), 9/6/1970, *Esterhuysen 32468* (BOL), 5/2/1963, *v. d. Merwe 1366* (K, PRE, STE), 100 ft., 28/7/1970, *v.d. Merwe 125* (K, STE), –/7/1962, *Macpherson s.n.* (NBG), 14/9/1962, *Lewis 6022* (NBG), 10/9/1969, *Rourke 1214* (NBG), 150 ft., 15/4/1972, *Williams 1646* (NBG), 600 ft., 15/4/1972, *Williams 1647* (NBG), 5/9/1964, *van Breda 1715* (PRE, STE); north side of pass from Wydgelegen to De Hoop, 600 ft., 22/9/1962, *Acocks 22762* (K, PRE), 300 ft., 26/8/1963, *van Breda 1638* (K, PRE), 350 ft., 9/4/1974, *Williams 1886* (NBG), 600 ft., 9/4/1974, *Williams 1889* (NBG), 350 ft., 3/8/1975, *Williams 2033* (NBG), 600 ft., 12/11/1962, *Taylor 4323* (PRE, STE); Windhoek Plateau, –/9/1969, *v. d. Merwe 1010, 1011* (PRE); limestone hills near Potberg, Bredasdorp Division (-BC), 19/9/1954, *Esterhuysen 23251* (BOL, NBG), *Blum 267* (E), 6/5/1949, *David s.n.* (NBG); 3,3 km S. of Potberg Farm, 500 ft., 21/11/1973, *Williams 1872* (NBG); Potberg Farm along road to the sea, 600 ft., 19/9/1979, *Williams 2779* (NBG).

Without precise locality: in montium lateribus prope Swellendam, –/10/–, *Mund s.n.* (SAM, S), *Drège s.n.* (K).

Putative hybrids: CAPE—3420 (Bredasdorp): De Hoop—Potberg Nature Reserve, along S. foothills of limestone hills about 1,2 km due E. of De Hoop Vlei (-AD), 60 m, 28/7/1979, *Burgers 2046* (Herb. Nat. Cons.); limestone hills above Grootfontein on W. side of De Hoop Vlei, 50 m, 3/7/1979, *Burgers 2100* (Herb. Nat. Cons.); Windhoek farm, upper N. facing slopes of limestone hills above Die Fontein on W. side of De Hoop Vlei, 31/7/1979, *Burgers 2097* (Herb. Nat. Cons.).

Distribution and Variation

Acmadenia mundiana, a fairly local species has only been found growing on the limestone hills between De Hoop Vlei and Potberg, a relatively small area 20 km in length. It is at the west end of this range, in the vicinity of De Hoop Vlei that this species appears to have hybridised with *Acmadenia obtusata* (Thunb.) Bartl. & Wendl. From this area C. Burgers has collected a whole range of putative hybrids showing a gradual change in leaf shape from one to the other. Amongst these are plants closely resembling *Acmadenia cucullata* which Drège collected in 1831.

Acmadenia mundiana, with staminodes fusiform and the small apical gland on the anther somewhat pointed, is recognised as distinct, having leaves broad, elliptic, obtuse, scabrid, ciliate, adaxially puberulous, petiolate and alternate with a prominent midrib. It differs from other broad leaved species of *Acmadenia* as follows: from *A. rupicola* which has a large pointed gland on the anther; from *A. alternifolia* which has very long horns on the fruit; from *A. kiwanensis* which has leaves lanceolate, acute; from *A. latifolia* which has leaves and petals acute; from *A. wittebergensis* which has leaves pungent; from *A. burchellii* which has leaves lanceolate, acute and glabrous; from *A. flaccida* which has leaves opposite; from *A. densifolia*, which is also found growing on limestone hills and has leaves acute and crisped pubescent.

21. Acmadenia obtusata (Thunb.) Bartl. & Wendl., Diosmeae in Beitr. Bot. **1**: 63 (1824). Type: e Cap. B. Spei, *Thunberg s.n.* (UPS-THUNB *5697*, holotype; LD-ACHAR *4041/123*, isotype).

Diosma obtusata Thunb., Prodr. Plant. Cap. **1**: 84 (1794). Type: as above.

Acmadenia juniperina Bartl. & Wendl. Diosmeae in Beitr. Bot **1**: 61 (1824). Type: without collector's name in Herb. Retzius (LD-ACHAR *4041/139*, GOET-WENDL).

Acmadenia muraltioides Eckl. & Zeyh., Enum. Plant.: 106 (1835). Type: South Africa: Inter frutices (altit. 2) in collibus calcareis et argillaceis inter flumina Zondags—et Coegarivier (Uitenhage). –/6/–, *Ecklon & Zeyher 830* (MEL, P, PRE, SAM, W).

Macrostylis patersoniae Schonl. in Trans. R. Soc. S. Afr. **1**: 445 (1910). Type: South Africa: Red House, –/11/1908, *Paterson 322* (BOL, K, PRE).

Acmadenia uniflora (Phillips) Phillips in Jl S. Afr. Bot. **9**: 137 (1943). Type: CAPE—3421 (Riversdale): Buffelshoek near sea, near Albertinia, Riversdale Division (-BC/BD), –/7/1913, *Muir 1106* (SAM, holotype; BOL, isotype).

Euchaetis uniflora Phillips in Ann. S. Afr. Mus. **9**(3): 115 (1913). Type: as above.

Shrubs 0,2 m tall, grazed down, dense, flowering stems ascending, single-stemmed at base. *Branches* at first erect becoming somewhat decumbent, fairly slender, tough, short, glabrescent, variously bent; bark greyish-brown, knotty with leaf scars. *Branchlets* numerous, slender, erect, puberulous, some elongated, others very short, densely clothed with leaves, *Leaves* 10–11 mm long, 1,3–1,7 mm broad, linear-lanceolate, acute, mucronate, very short adpressed petiolate, glabrous, erect, closely imbricate or adpressed opposite and decussate or alternate; hyaline margins narrow, scabrid-serrulate; midrib prominent, sub-scabrid towards the apex, gland-dotted to either side. *Inflorescence* solitary, terminal on numerous short branchlets often crowded towards the summits of erect stems; petals spreading 10 mm

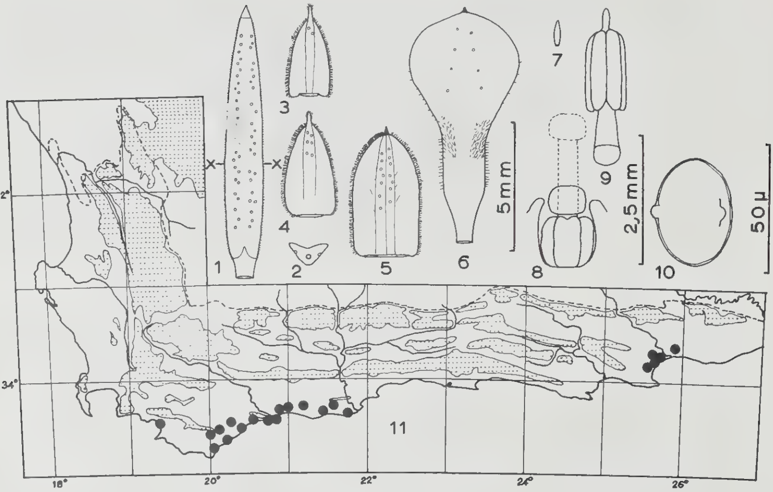

Fig. 19.

Acmadenia obtusata: 1, leaf. 2, section of leaf. 3, bract. 4, bracteole. 5, calyx lobe. 6, petal. 7, staminode. 8, gynoecium with disc. 9, anther. 10, pollen. 11, distribution.

diam., bright pink. *Bract* 3,5 mm long, 1,5 mm broad, oblong, acute, apiculate, glabrous, ciliate, broadly translucent, gland-dotted and coloured towards the apex; midrib prominent. *Bracteoles* two, 4 mm long, 1,8–1,9 mm broad, oblong, apiculate, glabrous, crisped ciliate, very broadly translucent; midrib towards the apex prominent, gland-dotted and coloured. *Calyx lobes* five, 5 mm long, 2,5 mm broad, oblong, obtuse, apiculate, glabrous, crisped ciliate; margins broadly translucent; midrib coloured, tri-nerved, with 2 rows of gland dots. *Petals* five, 9 mm long overall; *limb* 4–4,3 mm broad, orbicular, apiculate with a few gland dots, pink, spreading-recurved; *claw* 4 mm long, 1,5 mm broad, narrowing to the base, pubescent to either side of the midrib at the throat, sparsely ciliate above. *Staminodes* five, 0,5 mm long, somewhat fusiform, glabrous. *Filaments* five, becoming 2 mm long, stout, acicular, erect, glabrous. *Anthers* five, 2 mm long overall, 0,8 mm broad, orange-yellow; apical gland 0,4 mm long, somewhat fusiform. *Pollen* 42 µ long, 31 µ broad, ellipsoid. *Disc* obvallate, exceeds the ovary, surrounds the stigma at first, dark green, exudes nectar. *Stigma* 0,8 mm diam., capitate, globose. *Style* becoming 1,5 mm long, glabrous, erect. *Ovary* 5-carpellate, 1 mm long, 1 mm diam., virtually glabrous; apices emarginate. *Fruit* 5-carpellate, remaining partly concealed behind the persistent calyx lobes, 4 mm long, 4 mm diam., glabrous, smooth, gland-dotted, sparsely setulose on the margins above; *horns* 0,7 mm long, emarginate. *Seed* 3,3 mm long, 1,3 mm broad, black, shining; aril black on one side.

Although Thunberg gave no locality for his collection of his *Diosma obtusata*, it seems quite possible that he collected this plant during December 1773 on his second journey into Kaffraria when he penetrated as far as the Sundays River and must have passed over the limestone deposits which are common near the coast from the Swartkops to the Coega and Sundays Rivers where this plant is abundant. It is in this same area that this plant was found by Zeyher (*Acmadenia muraltioides*), Drège (*7146*) and Paterson (*Macrostylis patersoniae*). The description given by Bartling and Wendland when they made the combination *Acmadenia obtusata* was based upon a plant in Willdenow's herbarium, now known as *Acmadenia laxa* Williams, which Willdenow had labeled *Diosma obtusata 2*. Consequently specimens of *A. obtusata* sensu Bartl. & Wendl. are not conspecific with those of *A. obtusata* (Thunb.) Bartl. & Wendl. The description of *Acmadenia juniperina* Bartl. & Wendl. is based upon a specimen in Retzius' herbarium at Lund. From this a fragment has been detached and can be found in Wendland's herbarium at Göttingen. The specimen at Lund, 200 mm long, is without collector's name or locality but could very possibly have been a portion of Thunberg's original collection which it exactly matches. Consequently the name *Acmadenia juniperina* Bartl. & Wendl. is relegated to synonymy.

Although separated geographically by a disjunction of approximately 360 km, plants previously thought to belong to the species *A. uniflora* cannot be satisfactorily separated from those of *A. obtusata* with the result that the name A. *uniflora* has been placed in synonymy. The above description done from fresh material from the vicinity of the Coega River supplements those previously given by other authors.

SPECIMENS EXAMINED

CAPE—3419 (Caledon): Dadelkom, Hermanus/Die Kelders, Caledon Division (-AD), 200 ft., 7/11/1972, *Williams 1725* (NBG), 2/8/1973, *Williams 1833* (NBG); Elim, Bredasdorp Division (-DB), 600 ft., 15/7/1895, *Guthrie 3845* (NBG).
—3420 (Bredasdorp): de Hoop, sand dunes, Bredasdorp Division (-AD), –/10/1969, *v. d. Merwe 1183* (PRE); Windhoek farm, near Aasvoelkrans, W. side of De Hoop Vlei, 110 m, 31/7/1979, *Burgers 2096* (STE); Lekkerwater farm, Potberg (-BC), 8/9/1973, *Powrie 263* (BOL); Potberg farm on track to the sea, 200 ft., 19/9/1979, *Williams 2778* (NBG); Potberg area, Elandspad farm on road to Noetsie, 300 ft., 2/7/1972, *Williams 1668* (NBG); Potberg, Cape Infanta, Swellendam Division (-BD), 30/8/1948, *Blum 33* (E), 23/9/1947, *Walgate 875* (NBG); 1 mile west of Graslaagte, Heidelberg Division, 400 ft., 27/10/1972, *Williams 1719* (NBG); Bredasdorp Poort (-CA), 2/9/1943, *Compton 14733* (NBG), –/8/1940, *Walgate s.n.* (BOL); near Bredasdorp, 200 ft., –/7/1895, *H. Bolus 8472* (BOL, K), 24/8/1940, *Compton 9181* (NBG), 15/10/1951, *Esterhuysen 19160* (BOL, NBG), –/4/1927, *Dix s.n.* (SAM), 15/9/1944, *Henrici 3720* (BOL); 4,4 km from centre of Bredasdorp on road to Swellendam, 250 ft., 17/10/1975, *Williams 2111* (NBG); Wagenhuiskrans, Marcus Bay, –/2–6/

1900, *Fry s.n.* (GRA, PRE); towards Bredasdorp near Arniston, 90 ft., 20/9/1968, *Marsh 924* (PRE, STE), 28/8/1956, *van Niekerk s.n.* (BOL), 30–50 ft., 17/11/1971, *Williams 1598* (NBG), 50 ft., 6/10/1972, *Williams 1697* (NBG); Zoutendalsvalley, –/10/–, *Ecklon s.n.* (MEL); 5–6 miles from Struisbaai along road to Bredasdorp, 19/9/1962, *Esterhuysen 29718* (BOL); Skipskop, Bredasdorp Division (-CB), 50 ft., 22/6/1962, *Acocks 22260* (K, PRE).
—3421 (Riversdale): 14–16 miles south of Riversdale on the Blombos road, Riversdale Division (-AC), 22/9/1959, *Lewis 5621* (NBG), 14/4/1962, *Lewis 5935* (NBG), 28/7/1968, *Acocks 24008* (PRE, STE); near Klipfontein on the Blombos road, 500 ft., 31/10/1971, *Williams 1590* (NBG); 1,8 miles S.E. of Vermaaklikheid, 400 ft., 29/7/1962, *Acocks 22526* (STE); Still Bay hills, Riversdale Division (-AD), 9/8/1949, *Barker 5535 & 5537* (NBG), –/7–8/1909, *Steyn s.n.* (BOL, PRE), *Jordaan s.n.* (STE), –/10/1933, *Jordaan s.n.* (STE), –/9/1932, *de Villiers s.n.* (STE), –/9/1934, *van Niekerk & Harvey s.n.* (STE), –/1/1931, *L. Bolus s.n.* (BOL *19480*); near Milkwoodfontein, 600 ft., 7/10/1897, *Galpin 3846* (PRE); Buffelshoek near sea, near Albertinia, Riversdale Division (-BC/BD), –/7/1913, *Muir 1106* (BOL, GRA, K); Ryksdalersplaas near Albertinia (BA?), –/5/1913, *Muir 899* (BOL, SAM).
—3325 (Port Elizabeth): on the road towards Addo Road about 7 km east of Coega, Port Elizabeth Division (-DA), 6/9/1930, *Norlindh & Weimarck 515* (BOL, K, PRE); Inter frutices in collibus calcareis et argillaceis inter flumina Zondags –et Coegarivier, altit. 2, –/6/–, *Ecklon & Zeyher 830* (C, G, K, MEL, P, PRE, S, SAM, W), *Zeyher 417* (PRE, SAM), *Zeyher s.n.* (C, E, GRA, K, MEL, S); between Coega and Sundays River upon the lime flats, under 1 000 ft., 8/12/1829, *Drège 7146* (K, G, P, S, W); 2,4 miles from Coega on the Grahamstown Road, 17/3/1954, *Commins 760* (PRE); 7 miles E.N.E. of Coega, Port Elizabeth Division (-DB), 100 ft., 4/3/1948, *Acocks 14049* (PRE); Nanaga, Alexandria Division, 24/10/1941, *P. Bond 1238* (NBG); Coega (-DC), 500 ft., 17/8/1964, *Bayliss 2277* (G, NBG), –/–/1947, *Urton 721* (GRA), 150 ft., -/10/1908, *Rogers 4440* (BOL, GRA); Redhouse, Port Elizabeth Division, –/11/1908, *Paterson 322* (BOL, GRA, K, PRE), 4/9/1930, *Norlindh & Weimarck 515* (BOL, K, PRE), –/8/–, *West 116* (GRA, K), –/8/1912, *Rogers 3635* (PRE).

Without precise locality: In planite ad pedem mts. Winterhoek in ditione Uitenhage, –/12/–, *Zeyher 417* (PRE, SAM), Prom. b. Sprei, *Thunberg s.n.* (BM?, LDACHAR, *4041/123,* S?, UPS-THUNB *5697), Auge s.n.* (BM), *Niven s.n.* (BM), *Thom 74* (K), *Baur 1014* (K), herb. Retz *s.n.* (GOET-WENDL), (LD-ACHAR *4041/139).*

DISTRIBUTION AND VARIATION

Acmadenia obtusata occurs fairly frequently between Bredasdorp and the mouth of the Gouritz River near Albertinia. There is a small outlier about 55 km away to the west near Walker Bay and large populations are found in the vicinity of Algoa Bay 360 km to the east. This large disjunction appears to be without reason until one studies the geological map and finds that these plants are always associated with the Bredasdorp and the related Alexandra limestone beds where a similar disjunction exists.

A certain amount of variation has been observed in this species. The leaves may be opposite or alternate and may vary in length from 5–15 mm and in width from 1–2 mm; the apex may be pungent, mucronate or in one case obtuse *(Williams 1719)*; the midrib may be sparsely puberulous, scabrid or almost smooth. Staminodes may vary in length from 0,2 to 0,5 mm and the apical gland on the anther similarly from 0,2–0,4 mm.

HYBRIDS

The only hybridisation to have been observed occurs in the vicinity of De Hoop Vlei in the Bredasdorp District where C. Burgers has collected a complete range of specimens showing a gradual transition of putative hybrids from *A. obtusata* to *A. mundiana*. [*Burgers 2096, 2097, 2046, 2100* (Herb. Nat. Cons.).]

Acmadenia obtusata is recognised as a distinct species having staminodes fusiform up to 0,5 mm long, with the apical gland on the anther similarly fusiform up to 0,4 mm long, the style erect and with leaves linear-lanceolate, acute and glabrous. It differs from *A. densifolia* which has leaves crisped pubescent; from *A. trigona* which has petals with many more gland dots; from *A. gracilis* which has calyx lobes linear-lanceolate and crisped ciliate; from *A. kiwanensis* which has leaves minutely puberulous; and from *A. laxa* which has petals puberulous.

22. Acmadenia maculata Williams, sp. nov. propria propter folia alterna lineari-lanceolata glabro-mucronata adaxialia minute maculata marginibus crassis sparsim ciliolatis subscabridis, florem petalis ad fauce approximatis gynoecio occulto, antheras glandula minute coronata, fructum 5-carpellatum cornibus minus 2 mm longis.

Frutex 0,5 m altus, graciles, ad basim monocaulis. *Rami* breves, graciles, glabrescentes, flexuosi. *Ramuli* breves, graciles, minute puberuli, erecti, visibiles. *Folia* 5,5–6,3 mm longa in toto, 1,5–1,7 mm lata, lanceolata, acuta, rubromucronata, sparsim ciliolata, secus costam sparsim puberula, alterna, patentia; pagina adaxialia minute nigro-maculata; pagina abaxialia glanduloso-punctata; petioli 0,6 mm longi, puberuli. *Inflorescentia* 8 mm diam., solitaria, terminalis, numerosi, sessilis. *Bractea* 4 mm longa, 1,2 mm lata, lanceolatio-subulata, rubro-mucronata, marginibus ad basim late translucentibus, ciliolatis, intus ad basim minute nigro-maculata sparsim pubescens, extus glabra, ad costa glanduloso-punctata. *Bracteolae* duae, 3,5 mm longae, 1,5 mm latae, ovato-subulatae, rubro-mucronatae, ad apice minute glanduloso-punctatae, glabrae, intus minute nigro-maculatae, marginibus late translucentibus ciliatis. *Sepala* quinque, 3,5 mm longa, 1,5–1,8 mm lata, ovata, acuta, rubro-mucronata, costa tincta ad apex prominenti; intus pubescentia, marginibus late translucentibus ciliolatis. *Petala* quinque, 6,5 mm longa in toto, fauce protuberantia; *limbus* 3 mm longus, 2,8–3 mm latus sub-orbicularis, apiculatus, glaber, roseus, patens, sparsim ciliolatus, secus

medius minute 4-elevato-glandulosus; *unguis* 3,5 mm longus 1,5 mm latus, sursum pubescens, ciliolatus. *Staminodia* quinque, 0,6 mm longa, teretia, glabra, ad apice glandulosa. *Filamenta* quinque, 1,6 mm longa, subulata, glabra, erecta. *Antherae* quinque, ante anthesin 1,2 mm longae, 0,8 mm latae, floridae, glandula 0,012 mm diam., semi-immersa coronata. *Pollen* 51 μ longum, 34 μ latum, sub-quadrangulare. *Discus* obvallatus, ovarium excedens, nectarifer. *Stigma* 0,7 mm diam., depresso-globosum, captitatum, viridum. *Stylus* 1 mm longus, glaber, erectus. *Ovarium* 5-carpellatum, 0,7 mm longum, 0,8 mm diam., glabrum, apicibus globosis. *Fructus et semen* a nobis non visa.

Type: CAPE—3322 (Oudtshoorn): Eensaamheid, S.E. side of a flat topped hill, George Division (-DD), 685 m (2 250 ft.) alt., 16/7/1980, *Williams 3035* (NBG, holotype; BOL, PRE, isotypes).

Shrubs 0,5 m tall, slender, single-stemmed at base. *Branches* short, slender, glabrescent, variously bent. *Branchlets* short, slender, minutely puberulous, erect, not hidden by the leaves. *Leaves* 5,5–6,3 mm long overall, 1,5–1,7 mm broad, lanceolate, acute, red-mucronate, alternate, spreading; margins thick, sparsely ciliolate, sub-scabrid; adaxial surface minutely dotted with black-stalked glands; abaxial surface with scattered gland dots and

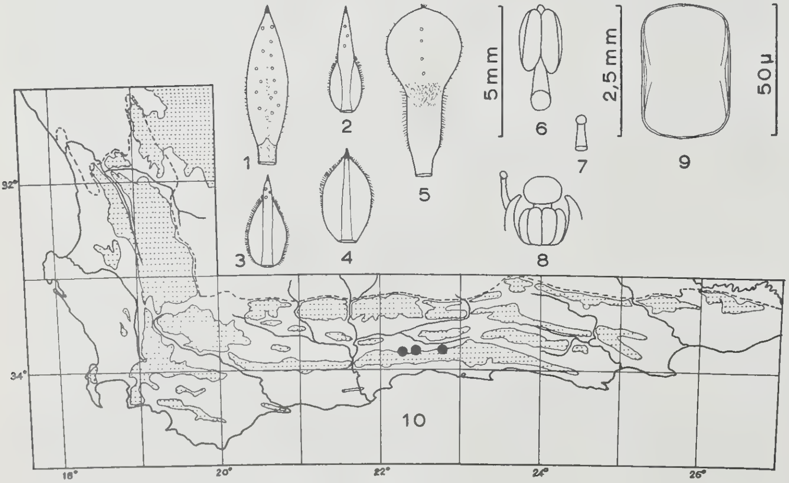

FIG. 20.
Acmadenia maculata: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, anther. 7, staminode. 8, gynoecium and disc. 9, pollen. 10, distribution.

sparsely puberulous along the midrib; petiole 0,6 mm long, puberulous. *Inflorescence* 8 mm diam., pink, solitary, terminal, sessile. *Bract* 4 mm long, 1,2 mm broad below, lanceolate-subulate, red-mucronate; margins ciliate, broadened and translucent below; adaxial surface sparsely pubescent in the middle below with minute black raised glands. *Bracteoles* two, 3,5 mm long, 1,5 mm broad, ovate-subulate, red-mucronate, minutely gland-dotted near the apex; margins broadly translucent, ciliolate; adaxial surface with minute black raised glands. *Calyx lobes* five, 3,5 mm long, 1,5–1,8 mm broad, ovate, acute, red-mucronate; margins ciliolate, broadly translucent; adaxially pubescent; abaxially glabrous with the midrib coloured and more prominent towards the apex. *Petals* five, 6,5 mm long overall, bulged inwards at the throat; *limb* 3 mm long, 0,8–3,0 mm broad, sub-orbicular, apiculate, glabrous, pink, spreading, very sparsely ciliolate, upper surface with about 4 minute raised glands up the middle; *claw* 3,5 mm long, 1,5 mm broad, pubescent above, ciliate. *Staminodes* five, 0,6 mm long, terete, glabrous, apex glandular. *Filaments* five, becoming 1,6 mm long, subulate, glabrous, erect. *Anthers* five, before anthesis 1,2 mm long, 0,8 mm broad, yellow; apical gland 0,012 mm diam., semi-immersed. *Pollen* 51 μ long, 34 μ broad, subquadrangular or oblong with parallel sides. *Disc* obvallate, exceeds the ovary, green, fairly level on top, exudes nectar. *Stigma* 0,7 mm diam., depressed globose, green, sticky. *Style* becoming 1 mm long, erect, glabrous. *Ovary* 5-carpellate, 0,7 mm long, 0,8 mm diam., glabrous; apices globose. *Fruit* and *seed* not seen. An old fruit that had cast its seed (from *Williams 3032)* was found to be 8 mm long including the horns about 1,5 mm long, 5 mm diam., minutely and sparsely puberulous above.

In the type locality this plant was first collected by Miss E. Esterhuysen in July 1973. However C. Thorne, was apparently the first person to collect this species. This was in August 1931 in two localities at Doorn River and again at Great Doorn River in the George District. Of this rather distinct species with minute glandular specks on the inside of the leaves, no other collections appear to have been made until now.

SPECIMENS EXAMINED

CAPE—3322 (Oudtshoorn): Great Doorn River, George District (-CD), 2 000 ft., –/8/1931, *Thorne s.n.* (SAM *51690*); Doorn River, George District, 2 500 ft., –/8/1931, *Thorne s.n.* (SAM *51691*); North end of Perdepoort, Doringrivier, George Division, 2 530 ft., 16/7/1980, *Williams 3032* (NBG, MO, PRE, STE); Molen River, Bokkeveld hillside at Eensaamheid, George District (-DD), 23/7/1973, *Esterhuysen 33213* (BOL); Eensaamheid, S.E. side of a flat topped hill, George Division, 685 m (2 250 ft.) 16/7/1980, *Williams 3025* (NBG, BOL, PRE).

DISTRIBUTION AND VARIATION

Acmadenia maculata has been found at altitudes of between 609 and

762 m (2 000–2 500 ft.) on south-facing slopes to the north side of the Outeniqua mountains over a distance of about 50 km in the George Division. Further to the west in the vicinity of the Robinson Pass one finds *A. gracilis* Dümm. but as far as is known no species of *Acmadenia* occurs behind the mountains further to the east. *A. maculata* appears to be extremely rare. In the type locality only three plants were seen.

A certain amount of variation has been observed in the specimens collected. Plants from the type locality have the smallest leaves and flowers and are more glabrous with the apical gland or the anther somewhat more immersed. Specimens collected by Thorne from Doorn River exhibit leaves with very long sharp points and have petals 8 mm long.

Amongst those species of *Acmadenia* with the petals close together at the throat concealing the gynoecium and with the anther bearing a small apical gland, *A. maculata* is distinct in having leaves alternate, lanceolate or linear-lanceolate, acute with a glabrous mucro, with margins thick, sparsely ciliolate and sub-scabrid, with minute black-stalked glands towards the centre of the adaxial surface and in having the fruit with horns about 1,5 mm long. It differs from *A. obtusata* which has leaves with thin translucent margins and without any black-stalked glands on the adaxial surface.

5. ACMADENIA sectio **ACMADENIA** Williams, sect. nov.propria propter florem pertalis ad fauce approximatis gynoecio plus minusve occulto et antheram glande apicali conoidea coronata.

Section *Acmadenia* is distinguished by having the flower with the petals at the throat close together more or less concealing the reproductive parts and with the anther crowned with a large conical gland.

Contains species:

23. *A. gracilis*
24. *A. heterophylla*
25. *A. rupicola*
26. *A. nivenii*
27. *A. sheilae*
28. *A. macropetala*
29. *A. baileyensis*
30. *A. tetragona*

23. Acmadenia gracilis Dümmer in Fedde Repert. **11**: 163 (1912). Type: CAPE—3322 (Oudtshoorn): On the ascent from Moeras River Drift, Oudtshoorn Division (-CC), 540 m (1 800 ft.), -/12/1905, *H. Bolus 11743* (K, lectotype; BOL, isotype).

Fruit 5-carpellate, 5 mm long, 4 mm diam., sparsely and minutely pubescent along the margins otherwise glabrous, not hidden by the calyx lobes;

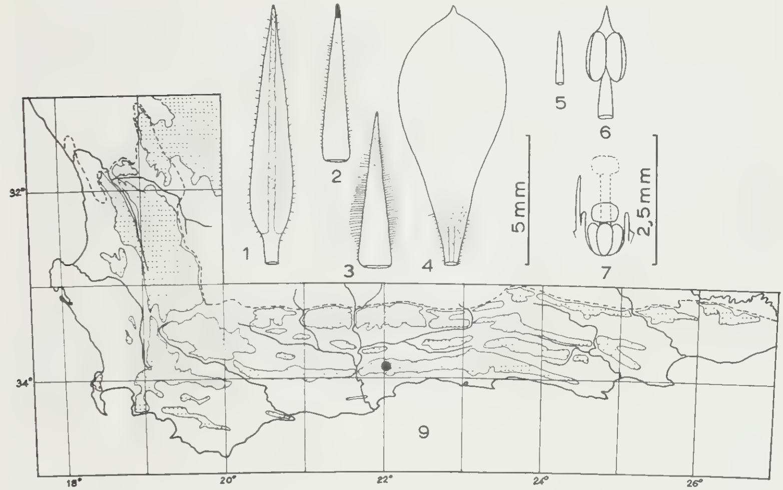

FIG. 21.
Acmadenia gracilis: 1, leaf. 2, bracteole. 3, calyx lobe. 4, petal. 5, staminode. 6, anther. 7, gynoecium with disc. 8, pollen. 9, distribution.

horns 0,5 mm long with an immersed gland at the apex. *Seed* 3,5 mm long, 1,3 mm broad, black, shining; aril black on one side.

As Dümmer cited specimens of this species at both Kew and at the Bolus herbarium without designating either as the holotype and as he states on page 120 that he was permitted to examine the material at Kew, the specimen at Kew has been chosen as the lectotype. The above description of the fruit supplements that given by Dümmer.

SPECIMENS EXAMINED

CAPE—332 (Oudtshoorn): On the ascent from Moeras River Drift, Oudtshoorn Division (-CC), 540 m (1 800 ft.), -/12/1905, *H. Bolus 11743* (K, (BOL, K);Robinson Pass, 22/3/1929, *Hutchinson 3149* (BM, K), 3 000 ft., 2/12/1951, *Compton 23651* (NBG), 30/6/1947, *Compton 19607* (BOL, NBG), 5/12/1950, *Barker 7139* (NBG); north side, 2 600 ft., 30/10/1971, *Williams 1570* (NBG); summit of Robinson Pass to the west behind the first summit, 3 050 ft., 5/5/1974, *Williams 1900* (NBG); Robinson Pass, mountain slopes, north side, 2/12/1951, *Esterhuysen 19312* (BOL, K, NBG).

Without locality: *Hops 88* (BOL), –/8/1912, *Rogers 4259* (GRA, K).

DISTRIBUTION

Acmadenia gracilis appears to be an extremely local species having been found only at the summit and on the north slopes of the Outeniqua mountains at the Robinson Pass.

Acmadenia gracilis is recognised as distinct on account of having calyx lobes 6 mm long, 1,3 mm broad at base narrowing evenly to an acute apex, sparsely pubescent and ciliate, the anther with a fairly large apical gland and staminodes 1 mm long. It differs from *A. trigona* which has larger leaves, a very small gland on the anther and much broader calyx lobes; from *A. rupicola* which has leaves closely imbricate; from *A. tenax* which has the style at some stage deflexed.

24. Acmadenia heterophylla Glover in Ann. Bol. Herb. **1**(3): 127 (1915). Type: CAPE—3422 (Mossel Bay): Mossel Bay (-AA), –/2/1914, *Brother Moran s.n.* (BOL *13234*, lectotype; SAM, isotype).

Icon: Edwards in Ann. Bol. Herb. **1**(3): plate 15, fig. B (1915).

Shrubs up to 0,4 m tall, dense, single-stemmed at base, often grazed right down. *Branches* short, tough, variously bent, with a rough greyish-brown bark. *Branchlets* slender, erect, some very short, reddish, puberulous. *Leaves* varying,0,8 mm long and 1,4 mm broad to 4,5 mm long and

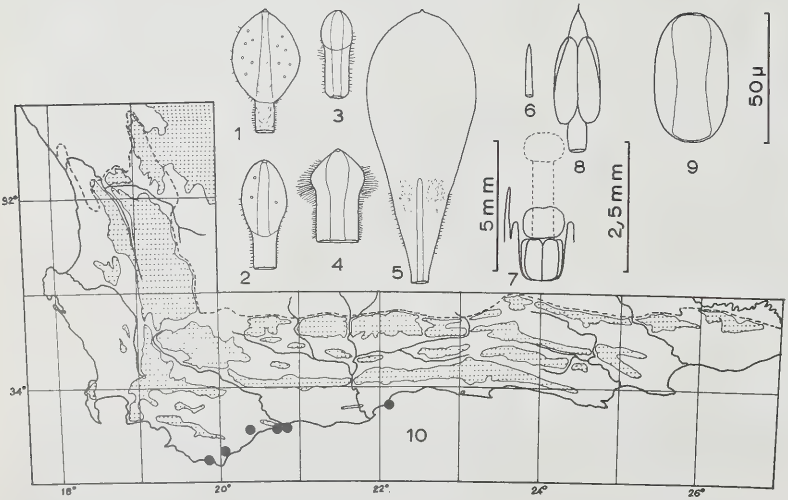

FIG. 22.
Acmadenia heterophylla: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, staminode. 7, gynoecium with disc. 8, anther. 9, pollen. 10, distribution.

3,4 mm broad, longer leaves being narrower, linear-elliptic, elliptic, subcomplicate, short-petiolate, spreading or spreading-erect, often imbricate, opposite, decussate or alternate, adaxially glabrous, abaxially glabrous or sparsely spiky-pubescent, gland-dotted mainly towards the midrib and margins; apex trigonal, acute, mucronate or obtuse; midrib prominent, very sparsely pubescent; margins scabrid or sparsely spiky-ciliate mainly below. *Inflorescence* solitary, terminal, 9 mm diam., pink; petals recurved. *Bract* leaf-like, petiolate. *Bracteoles* two, 3 mm long, 1,4 mm broad, oblong, apiculate, obtuse, glabrous; margins below broadly translucent, ciliate. *Calyx lobes* five, apex, 1,3 mm long, 1 mm broad, spreading, green, thick; lower part 2,5 mm long, 2,2 mm broad, ciliate, translucent at the sides. *Petals* five, 7,2 mm long; *limb* 4,7 mm long, 3,5 mm broad, ovate, obtuse with a small blunt point, sparsely gland-dotted; *claw* 2,5 mm long, narrowing to the base, sparsely ciliolate, sparsely pubescent at the sides at the throat. *Staminodes* five, 0,7–1,2 mm long, acicular, glabrous; apex glandular. *Filaments* five, becoming 2 mm long, linear, glabrous. *Anthers* five, 2,3 mm long overall, 0,8 mm broad before anthesis; apical gland 0,7 mm long, conical, sticky at the tip. *Disc* obvallate, exceeds the ovary by a long way, green, exudes nectar. *Stigma* 0,8 mm diam., globose, green. *Style* becoming 1,2 mm long, glabrous, erect. *Ovary* 5-carpellate, 0,8 mm long, 0,9 mm diam., glabrous, apices faintly tri-lobed. *Fruit* 5-carpellate, 4,5 mm long, 3,5 mm diam., glabrous; *horns* 0,5 mm long, cleft at the apex. *Seed* 2,7 mm long, 1,3 mm diam., black, shining; aril small, black on one side.

Although collected by Burchell in the year 1814, this species, like many others in Burchell's herbarium, remained unnoticed until one hundred years later when a collection made by Brother Moran was described by Miss Glover in 1915. The above description done from fresh material amplifies that given by Miss Glover in the *Annals of the Bolus Herbarium*.

SPECIMENS EXAMINED

CAPE—3419 (Caledon): in dunis prope Brandfontein, Bredasdorp Division (-DD), 30 ft., 30/4/1897, *Schlechter 10577* (BM, BOL, E, G, GRA, MEL, P, PH, PRE, S, W); Brandfontein amongst rocks on flats half a mile from coast, 13/10/1951, *Esterhuysen 19116* (BOL); Brandfontein/Asfontein, Bredasdorp Division, 40 ft., 30/1/1973, *Williams 1756* (NBG).

—3420 (Bredasdorp): Bontebok Park, Bredasdorp Division (-CA), 17/2/1951, *Barker 7237* (NBG); Windhoek Farm, west side of De Hoop Vlei (-AD), 25 m, 23/6/1979, *Burgers 1988* (STE); Elandspad Farm, South Potteberg towards the coast at Stillegat, Swellendam Division (-BC), 100 ft., 12/4/1972, *Williams 1637* (NBG); near Cape Infanta, Swellendam Division, 28/9/1959, *Esterhuysen 28313* (BOL); behind Oysterbeds Hotel, Port Beaufort, 40 ft., 19/9/1968, *Marsh 813* (STE).

—3422 (Mossel Bay): Mossel Bay (-AA), 8/6/1929, *Salter 371/24* (BM), –/2/1914, *Brother Moran s.n.* (BOL *13234*, SAM *9066*); in campis prope Mossel Bay, –/9/1899, *Browne s.n.* (BOL, SAM); between the loading place at Mossel Bay and Cape St

Blaize, 23/10/1814, *Burchell 6265* (K); Mossel Bay, macchia near Golf Course, 7/8/1936, *Lindeberg s.n.* (S); Tunnel Caves, Mossel Bay, 350 ft., 26/12/1971, *Williams 1617* (NBG).

DISTRIBUTION

Acmadenia heterophylla appears to grow only in pockets of soil upon the Bredasdorp Limestone formation. Never very far from the coast it extends from just west of Cape Agulhas at Brandfontein to Cape St Blaize at Mossel Bay. Although it has been collected in various places to the west of Cape Infanta there appears to be a large disjunction in the distribution before it reappears again in the vicinity of Mossel Bay.

Acmadenia heterophylla is recognised as distinct having a small pointed anther gland and acicular staminodes, *the claw of the petal thinly pubescent at the sides*, leaves elliptic, obtuse, strongly keeled with a varying degree of spiky pubescence mainly on the midrib and margins, and the fruit glabrous with horns very short, obtuse and bifid at the apex.

25. Acmadenia rupicola Williams in Jl S. Afr. Bot. **45**(2): 163 (1979). Type: CAPE—3322 (Oudtshoorn): Robinson Pass, south side, Mossel Bay Division (-CC), 850 m alt., 6/12/1977, *Williams 2431* (NBG, holotype).

Amongst those species of *Acmadenia* with a large conical anther-gland and with needle-like staminodes, *Acmadenia rupicola* is distinct in having alternate leaves.

26. Acmadenia nivenii Sonder in Fl. Cap. **1**: 380 (1860). Type: Prom. b. Spei, *Niven s.n.* (BR-MART, lectotype; S, isotype).

Shrubs 0,3–0,4 m tall, single-stemmed at base; one plant in ground not so recently burnt, 1 m tall, showed about 17 growth rings in a section of the stem about 12 mm diam. *Branches* not very numerous, lax, glabrous, bark greyish-brown, fairly smooth with small leaf scars. *Branchlets* fairly erect at first, not numerous, slender, mostly hidden by the appressed leaves, reddish and glabrous where exposed, very sparsely pubescent where protected by the leaves, often opposite. *Leaves*, on seedlings and young plants the lowest leaves are imbricated in 4 rows, when mature 6–8 mm long, 1–1,4 mm broad, linear-elliptic, obtuse, callused, crisped ciliate, glabrous, gland-dotted, sessile, adpressed erect, opposite, decussate; margins narrowly translucent. *Inflorescence* solitary, terminal on short branchlets of varying length; *flowers* about 20 mm diam., pink to red with a dark red midrib. *Bracts*, below the bracts are two pairs of reduced leaves about 3,5 mm long, the flower readily breaks off above the two bracts which are 4,4 mm long, 2 mm broad, broadly lanceolate or elliptic, glabrous; midrib green, gland-dotted, prominent with a blunt point; margins crisped ciliate, broadly trans-

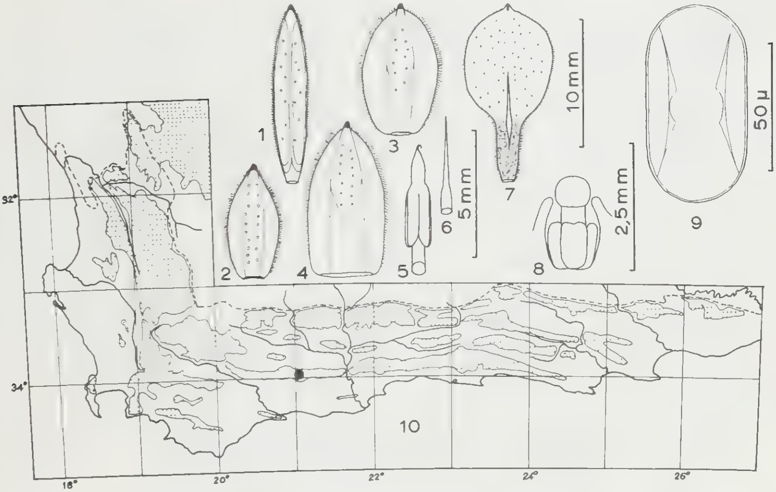

FIG. 23.
Acmadenia nivenii: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, anther. 6, staminode. 7, petal. 8, gynoecium with disc. 9, pollen. 10, distribution.

lucent. *Bracteoles* two, 5 mm long, 3 mm broad, elliptic, glabrous, coloured; margins crisped ciliate, broadly translucent; midrib green, gland-dotted, prominent with a blunt elevated point. *Calyx lobes* five, 6 mm long, 3 mm broad, oblong-elliptic, glabrous, coloured; margins crisped ciliate, broadly translucent; midrib green, gland-dotted, prominent with a blunt elevated apex. *Petals* five, 14 mm long overall; *blade* 9,5 mm long, 7 mm broad, orbicular, spreading, glabrous, multi-gland-dotted, ciliolate, somewhat apiculate with the apex minutely gibbous, midrib reddened below; *claw* 4,5–5 mm long, 2 mm broad above, narrowing to the base, ciliate, adaxially pubescent. *Staminodes* five, 2,6 mm long, acicular, glabrous, glandular translucent above, erect. *Filaments* five, becoming 3 mm long, acicular, glabrous, erect. *Anthers* five, before anthesis, 4 mm long overall including the apical gland, 1 mm broad, orange-red; apical gland stout, sharply pointed and hooked at the tip which exudes nectar. *Pollen* 78 μ long, 40 μ broad, oblong. *Disc* narrow, green, exceeds the ovary by a long way, touches the stigma. *Style* becoming 1,5–1,8 mm long, erect, green, glabrous, persisting. *Ovary* carpellate, 0,9 mm long, 1 mm diam., glabrous, green, apices somewhat emarginate. *Fruit* 5-carpellate, more than half concealed by the persistent calyx lobes, 8–8,2 mm long, 5–5,4 mm diam., quite glabrous, gland-dotted mainly towards the margins; *horns* very short, erect, emarginate, 1,5–2 mm long; pedicel about 1 mm long or much less. *Seed* 5–5,2 mm long, 1,8–1,9 mm broad, black, shining; aril black on one side.

This plant was collected by James Niven at the beginning of the century and, as was very often the case, no locality was given. Sonder, when revising the Rutaceae for the *Flora Capensis*, recognised Niven's specimen, which was in Maritius' herbarium, to be a distinct species and detached a portion for his herbarium. No further material belonging to this species appears to have been collected until in November 1978 when it was rediscovered by Mrs P. A. Bean on the northern slopes of the Gysmanshoek Pass in the Langeberg north of Heidelberg. A collection made by R. A. Haynes in September 1978, although preceding that of Mrs A. Bean, was not brought to my attention until this manuscript was being typed out in August 1980. As Niven's specimen had been in bud, the rediscovery of this species has enabled the above more detailed description to be made from fresh material.

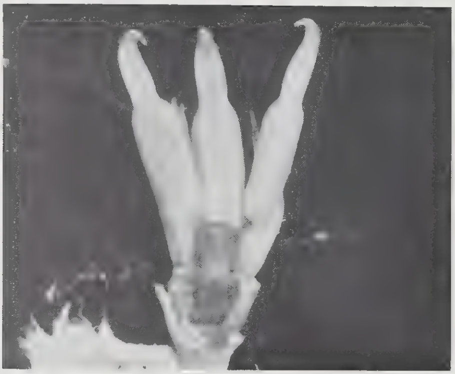

FIG. 24.
Acmadenia nivenii: Dissection of flower showing anthers with large pointed apical glands.

SPECIMENS EXAMINED

CAPE—3321 (Ladismith): north side of Gysmanshoek Pass, Heidelberg Division (-CC), 2 000–2 400 ft., 22/9/1978, *Bean 132* (BOL), 17/10/1978, *Williams 2613* (NBG), 4/12/1978, *Williams 2655* (NBG); Garcia State Forest, Langeberg Mountains, N. slopes west of Garcia Pass, c. 1 900 ft., 26/9/1978, *Haynes 1453* (Wicht Herbarium, Jonkershoek).

Without locality: Promont. b. Spei, *Niven s.n.* (BR-MART *1128*, lectotype; S, isotype).

DISTRIBUTION

Acmadenia nivenii, although quite frequent locally on the northern slopes of the Langeberg at Gysmanshoek Pass, appears to have a very limited distribution, not being found as far to the east as Garcia's Pass, nor as far to the west as Tradouw Pass.

Amongst those species of *Acmadenia* with a large conical anther-gland and with needle-like staminodes, *Acmadenia nivenii* is distinct in having leaves opposite, decussate, adpressed erect, sessile, linear-elliptic, obtuse, callused, crisped ciliate, and with many small gland dots.

27. Acmadenia sheilae Williams in Jl S. Afr. Bot. **40**(4): 281 (1974). Type: Cape Province, Ladismith Division, Roodeberg, near Van Wyk's Dorp, 4 000 ft., 1/11/1931, *Compton 3859* (BOL, holotype; K, isotype).

Acmadenia gracilis Compton in J. Bot., Lond. **70**: 285 (1932) nom. illegit. non Dümmer (1912) Type: as above.

Amongst those species of *Acmadenia* with a large conical anther-gland and with needle-like staminodes, *Acmadenia sheilae* is distinct in having leaves opposite, decussate, oblong, obtuse, eciliate or sparsely ciliolate and short-petiolate. Its distribution extends from the Roodeberg to the Swartberg and on to the Touwsberg.

28. Acmadenia macropetala (Glover) Compton in J. Bot., Lond. **70**: 286 (1932). Type: CAPE—3421 (Riversdale): Hills around Albertinia, Riversdale Division (-BA), –/6/1913, *Muir 930* (BOL, lectotype; GRA, K, isotypes).

Acmadenia obtusata Bartl. & Wendl. var. *macropetala* Glover in Ann. Bol. Herb. **1**(3): 127 (1915). Type: as above.

Icon: Edwards in Ann. Bol. Herb. **1**(3): plate 15, fig. A. (1915).

Shrubs about 0,5 m tall, diffuse, spreading amongst other vegetation, single-stemmed at base; a lower branch showed 20 growth rings. *Branches* slender, lax, glabrous, fairly smooth, leaf scars inconspicuous, bark brownish-grey. *Branchlets* very slender, fairly long, puberulous, never quite straight. *Leaves* 3,3–7 mm long, 1,3–1,7 mm broad, lanceolate, obtuse, virtually sessile, ciliolate, glabrous, adpressed erect, opposite, decussate, adaxially concave, abaxially round keeled, multi-gland-dotted. *Bud* acute, pink. *Inflorescence* 20 mm diam., solitary, terminal between a pair of incipient branchlets. *Bracts* two, opposite, leaf-like, 2,5 mm long, 1,5 mm broad, ovate-lanceolate, obtuse, glabrous, adpressed; margins ciliolate, broadly translucent; abaxially round-keeled. *Bracteoles* two, 3 mm long, 1,7 mm broad, ovate-lanceolate, obtuse, adpressed, glabrous; midrib prominent rounded, gland-dotted; margins ciliolate, broadly translucent. *Calyx lobes* five, 4,4 mm long, 2 mm broad, oblong, obtuse; margins broadly translucent, pink, ciliolate; midrib rounded, green, gland-dotted in two rows: adaxial surface very sparsely pubescent in the middle below. *Petals* 10–12 mm

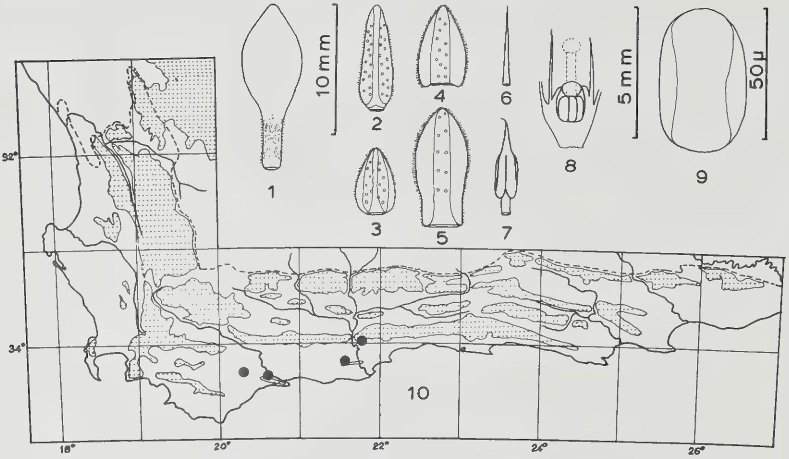

Fig. 25.
Acmadenia macropetala: 1, petal. 2, leaf. 3, bract. 4, bracteole. 5, calyx lobe. 6, staminode. 7, anther. 8, gynoecium with disc, staminode and filament. 9, pollen. 10, distribution.

long; *limb* 7 mm long, 4,7 mm broad, elliptic, obtuse, glandular apiculate, gland-dotted in two rows, spreading; *claw* 3–4 mm long, 1,6 mm broad, pubescent, ciliolate. *Staminodes* five, up to 3 mm long, acicular, glabrous. *Filaments* five, becoming 2,5 mm long, erect, acicular, glabrous. *Anthers* five, 1,7 mm long, 0,8 mm broad, red/yellow; apical gland 1,2 mm long, conical, incurved above. *Pollen* 55 µ long, 33 µ diam., oblong. *Disc* obvallate, exceeds the ovary, surrounds the stigma at first. *Stigma* 0,7 mm diam., globose, capitate, green. *Style* becoming 1,7 mm long, terete, glabrous, erect. *Ovary* 5-carpellate, 1 mm diam., glabrous. *Fruit* 5-carpellate, 7 mm long, 4,5 mm diam., pubescent between the carpels; *horns* 1-2 mm long, emarginate. *Seed* 4,7 mm long, 1,5 mm broad, black, shining; aril black on one side.

When Miss Glover described this plant as a variety of *Acmadenia obtusata* Bartl. & Wendl., she confined her diagnosis to a description of the petal alone. Fortunately this was accompanied by an excellent drawing by G. Edwards which leaves no doubt as to the identity of the plant. In raising this variety to species level Compton gave no further information. The above detailed description, done from fresh material is therefore the first to be given of this plant.

SPECIMENS EXAMINED

CAPE—3420 (Bredasdorp): hills 1 km east of the Bredasdorp/Swellendam road near Vrede, Swellendam Division (-AD), 290 m (950 ft.) alt., 12/8/1973, *Williams 1844* (NBG); Potberg mountain, northern side above Diepkloof, Swellendam Division (-BC), 330 m, 20/6/1979, *Burgers 1968* (STE).

—3421 (Riversdale): hills around Albertinia, Riversdale Division (-BA), -/6/1913, *Muir 930* (BOL, GRA, K); Albertinia near cemetery, Riversdale Division, 600 ft., 6/7/1973, *Williams 1822* (NBG).

—3321 (Ladismith): Cloete's Pass, Mossel Bay Division (-DD), *Muir 2927* (BOL).

DISTRIBUTION

Acmadenia macropetala has been very seldom collected. Such collections as have been made are from relic patches of quartzitic rocks associated with ochreous clay and geographically very widely separated.

Amongst those species of *Acmadenia* with a large conical anther-gland and with needle-like staminodes, *Acmadenia macropetala* is distinct having leaves opposite, decussate, lanceolate, obtuse, ciliolate, adpressed erect, with many gland dots.

29. Acmadenia baileyensis Williams, sp. nov. earum glandula antherae conica staminodiisque acicularibus propria propter folia oblanceolata obtussima, filamenta staminodiaque sparsim pubescentia.

Frutex 0,5 m, ad basim monocaulis. *Rami* aliquanti, brevi, erecti, glabrescentes. *Ramuli* numerosi, brevi, erecti, puberuli, foliosi. *Folia* 6 mm longa, 2,3 mm lata, oblanceolata, trigono-obtusa, glabra, opposita, decussata, erecta, imbricata, in sicco sub-complicata, breve petiolata, marginibus serrulatis, sparsim ciliolatis. *Inflorescentia* 17 mm diam., solitaria, terminalia, rosea. *Bracteae* duae, oppositae, 4,2 mm longae, 3,2 mm latae, late oblanceolatae, obtusae, ad apice forte carinatae, pauci glanduloso punctata, marginibus late hyalinis ad basim ciliatis. *Bracteolae* duae, 4,8 mm longae, 3,5 mm latae, late oblanceolatae, trigono-obtusae, ad apice forte carinatae, glabrae, glanduloso-punctatae, ad basim late hyalinae. *Sepala* quinque, 5–5,6 mm longa, 2,8–4,2 mm lata, late lanceolata, obtusa, intus pubescentia, glanduloso-punctata, apicibus recurvo-carinatis, marginibus ciliatis, late hyalinis. *Petala* quinque, in toto 14 mm longa; *limbus* 8 mm latus, orbiculare, glanduloso-punctatus, apice minute glanduloso-apiculato, marginibus ad basim sparsim ciliolatis; *unguis* 6 mm longum, pubescens, sparsim ciliolatum. *Staminodia* quinque, 2,5 mm longa, acicularia, sparsim pubescentia. *Fila* quinque, 3,2 mm longa, acicularia, sparsim pubescentia. *Antherae* quinque, in toto 2,2 mm longae, glandulis apicalibus 0,7 mm longis. *Pollen* 58 μ longum, 42 μ latum, ellipticum. *Discus* obvallatus, ovarium excedens, viridus, angustus, sinuatus. *Stigma* 1 mm diam., globosum, viridum. *Stylus* 1,7 mm longus, erectus, glaber. *Ovarium* 5-carpellatum, 1 mm longum, 1,2 mm diam., glabrum, carpellis obtusis emarginatis.

Type: CAPE—3321 (Ladismith): north slopes of Bailey Peak, Rooiberg, Ladismith Division (-CB), 1 280 m (4 200 ft.) alt., 3/11/1975, *Williams 2136* (NBG, holotype).

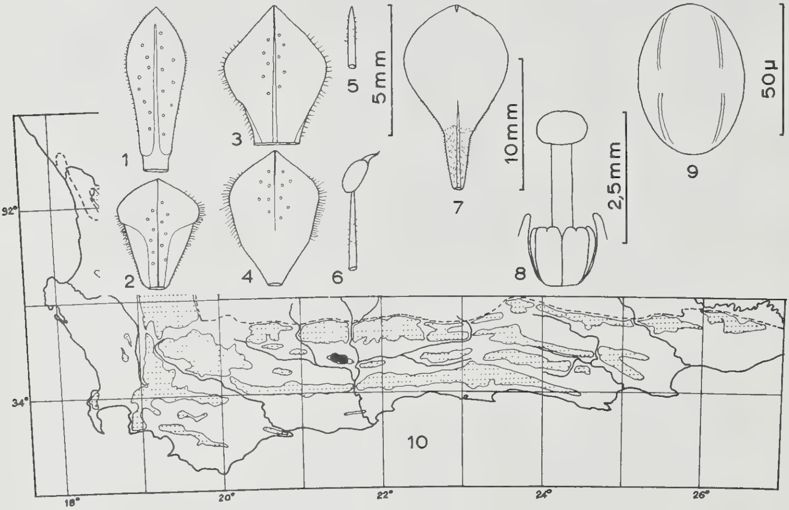

Fig. 26.
Acmadenia baileyensis: 1, leaf. 2, bract. 3, calyx lobe. 4, bracteole. 5, staminode. 6, anther, side view after anthesis. 7, petal. 8, gynoecium and disc. 9, pollen. 10, distribution.

Shrubs 0,5 m tall, single-stemmed at base. Branches fairly numerous, short, erect, glabrescent; leaf scars not prominent. *Branchlets* numerous, short, erect, puberulous, well clothed with leaves. *Leaves* 6 mm long overall, 2,3 mm broad, oblanceolate, trigonal-obtuse, glabrous, erect, imbricate, opposite, decussate, sub-complicate when dry; margins serrulate, sparsely ciliolate; petiole 0,7 mm long. *Inflorescence* solitary, terminal, 17 mm diam., pink. *Bracts* two, opposite, 4,2 mm long, 3,2 mm broad, broadly oblanceolate, obtuse, strongly keeled above, broadly translucent and ciliate below; gland dots few, indistinct. *Bracteoles* two, 4,8 mm long, 3,5 mm broad, broadly oblanceolate, obtuse, strongly keeled above, apex 3-angled, glabrous, gland-dotted, ciliate, broadly translucent below. *Calyx lobes* five, 5–5,6 mm long, 2,8–4,2 mm broad, broadly lanceolate, obtuse, apex keeled and recurved; abaxially glabrous, gland-dotted; adaxially pubescent about the middle; margins ciliate at the sides, broadly translucent. *Petals* five, 14 mm long overall; *limb* 8 mm broad, orbicular, gland-dotted; apex minutely glandular apiculate; margins below sparsely and minutely ciliolate; *claw* 6 mm long, narrowing to the base, internally pubescent, sparsely ciliolate. *Staminodes* five, 2,5 mm long, acicular, sparsely pubescent. *Filaments* five, 3,2 mm long, acicular, sparsely pubescent. *Anthers* five, 2,2 mm long overall including the conical apical gland 0,7 mm long. *Pollen* 58 μ long, 42 μ broad, elliptic. *Disc* obvallate, narrow, sinuate, green, exceeds the ovary. *Stigma* 1 mm diam., globose, green. *Style* 1,7 mm long, glabrous, erect. *Ovary* 5-carpellate, 1 mm long, 1,2 mm diam., glabrous; carpels obtuse, emarginate. *Fruit* and *seed* not seen.

This plant was discovered in November 1975 on the north slopes of Bailey Peak near the summit in the Rooiberg near Ladismith. At the time it was thought to be *Acmadenia sheilae.* However at a later date it was noticed that the shape of the leaves appeared to be somewhat different and the filaments and staminodes were found to be sparsely pubescent. There seems to be no doubt that it is a vicarious species in the group containing *A. sheilae, A. nivenii, A. macropetala* and *A. tetragona* all of which occupy distinct but not overlapping geographical areas.

Specimens Examined

CAPE—3321 (Ladismith): north slopes of Bailey Peak, Rooiberg, Ladismith Division (-CB), 1 280 m (4 200 ft.) alt., 3/11/1975, *Williams 2136* (NBG); Rooiberg just N. of "TV plateau" on the property "Rooigrond". TR 439, Ladismith Division (-DA), c. 4 250 ft., 20/4/1977, *Taylor 9624* (STE).

Amongst those species of *Acmadenia* with a large conical anther-gland and with needle-like staminodes, *Acmadenia baileyensis* is distinct in having leaves opposite, decussate, sub-complicate, oblanceolate and very obtuse and in having the filament and staminode very sparsely pubescent.

30. Acmadenia tetragona (Linn. f.) Bartl. & Wendl. Diosmeae in Beitr. Bot. **1**: 65 (1824). Type: Cap. bonae spei. *Sparrmann* (S, lectotype; S, LD, isotypes).

Diosma tetragona Linn. f., Suppl. Plant.: 155 (1781). Type: as above.

Bucco tetragona Roem. & Schult., Syst. veg **5**: 444 (1819) in part.

Acmadenia strobilina E; Mey. in Dreģe, Zwei Pflanz. Doc.: 117, 161 (1844) nom. nud.

Shrubs 0,3 to 0,6 m tall, spreading, single-stemmed at base. *Branches* short, fairly erect, clothed with a short erect pubescence, knotty with leaf scars. *Branchlets* fairly numerous, short, erect, hidden by the leaves, erect pubescent. *Leaves* strongly keeled, the two halves of the blade set at an angle, orbicular when pressed flat, 4,8 mm long, 4,2 mm broad, minutely pubescent, gland-dotted, ciliate, adaxially glabrous, opposite, decussate,

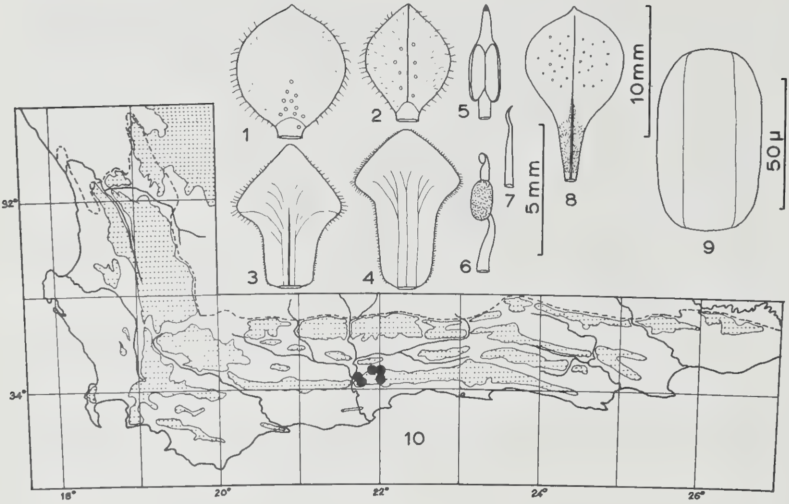

FIG. 27.
Acmadenia tetragona: 1, leaf flattened out. 2, leaf. 3, bracteole. 4, calyx lobe. 5, anther. 6, anther, side view after anthesis. 7, staminode. 8, petal. 9, pollen. 10, distribution.

spreading; apex trigonal obtuse; petiole very short. *Inflorescence* terminal, solitary, 20–25 mm diam., white with a red midrib. *Bracts* four, 5,5 mm long, 4 mm broad, keeled, minutely pubescent, gland-dotted, ciliate; margins broadly translucent below. *Calyx lobes* five, 6 mm long, 4 mm broad, keeled, sparsely pubescent and purplish above; apex obtuse, trigonal; trinerved, pale, glabrous and translucent below. *Petals* five, 13,5 mm long, 7,8 mm broad; *limb* spreading, orbicular, apiculate, minutely ciliate, abaxially multi-gland-dotted, narrowing below; *claw* about 4 mm long, narrowing towards the base, ciliate, adaxially pubescent, midrib prominent. *Staminodes* five, 3 mm long, 0,3 mm diam., acicular, glabrous, apex glandular. *Filaments* five, 3 mm long, 0,5 mm diam., acicular narrowing above, glabrous. *Anthers* five, before anthesis 2,3 mm long, 1,2 mm broad, orange tinged with red; apical gland 1,5 mm long, greenish and incurved at the glandular apex. *Pollen* about 69 µ long, 41 µ broad, oblong. *Disc* obvallate, a narrow rim level on top equalling the top of the stigma at first, green, exudes nectar. *Stigma* 0,8 mm diam., capitate, globose, dark green. *Style* becoming 1 mm long, persistent. *Ovary* 5-carpellate, 1 mm diam., apex pubescent. *Fruit* 5-carpellate, surrounded two-thirds of the way up by the persistent calyx lobes, 7,5 mm long, 4,7 mm diam., fringed with short spiky hairs on the margins and at the apex, gland-dotted; *horns* 1 mm long, erect, extremely short, without any apical gland. *Seed* 5 mm long overall, 1,8 mm broad, black, shining; aril black on one side.

The first person to collect *Acmadenia tetragona* was probably C. P. Thunberg when he passed through Attaquaskloof on his second journey to Kaffraria in the year 1773. However it was Anders Sparrmann, who travelled through Attaquaskloof two years later and collected the same plant, whose specimen was used to name this plant. A part of his collection was seen by Linnaeus whose son later published the description of *Diosma tetragona* in the *Supplementum Plantarum* in 1781. No type specimen remains in Linnaeus' herbarium but in Smith's herbarium housed at the Linnean Society in London one finds a fragment without collector's name labelled *HL fil.* which may be the original type or at least an isotype. Duplicates of Sparrmann's collection of *tetragona* are to be found at Lund (LD) and at Stockholm (S) and of these one sheet at Stockholm, inscribed on the reverse *Diosma tetragona Cap.B.Sp. Sparrmann*, has been chosen as the lectotype.

In Thunberg's herbarium No. 5716 *Diosma tetragona* is made up of a mixed collection of *Euchaetis pungens* and *Acmadenia tetragona.* His No. 5717 *Diosma tetragona* consists of two twigs of *A. tetragona.* So it is quite understandable that Thunberg's description should refer more or less to *Euchaetis pungens* and that Roemer & Schultes who transferred *Diosma tetragona* to *Bucco tetragona* should have found that the descriptions of Thunberg and of Linnaeus fil. did not agree.

E. Meyer, in going through Drège's collections, gave this little-known plant the manuscript name of *Acmadenia strobilina.*

The above description done from fresh material amplifies those previously given.

SPECIMENS EXAMINED

CAPE—3321 (Ladismith): 3 miles from Grootplaas on road to Woeska, Mossel Bay Division (-DC), 1 050–1 750 ft. alt., 3/11/1975, *Williams 2142* (NBG); stony places in Attaquaskloof (-DD), 1 500–2 000 ft. (IV, A, 17) 22/5/1833, *Drège s.n.* (BM, E, G, K, MEL, P, PRE, S); upper slopes of Langeberg, Cloetes Pass, Mossel Bay Division, –/7/1913, *Muir 977* (BOL), –/6/1914, *Muir 1403* (SAM); Attaquaskloof, *Dr. Gill s.n.* (K); Cloetes Pass, 10/8/1952, *Hall 538* (NBG).
—3322 (Oudtshoorn): Robinson Pass (-CC), 9/6/1929, *Salter 376/26* (BM, K), 2 000 ft., 27/11/1949, *Compton 21836* (NBG), 2 250 ft., 27/5/1956, *Heginbotham 322* (NBG); Robinson Pass, north side, Oudtshoorn Division, –/8/1905, *A. Taylor s.n.* (BOL *10585*, GRA, K), *Hops 71* (BOL), 2 600 ft., 30/10/1971, *Williams 1569* (NBG); top of Robinson Pass, Mossel Bay/Oudtshoorn, 30/6/1947, *Compton 19593* (BOL, NBG), 2 600 ft., 2/8/1959, *Acocks 20584* (K, PRE), 22/10/1962, *Killick 3472* (K, PRE); Robinson Pass, south side, Mossel Bay Division, 1 000–2 500 ft., 2/12/1951, *Esterhuysen 19303* (BOL, NBG), 2 450 ft., 5/5/1974, *Williams 1899*

(NBG); foothills N. side of Outeniquas near Moeras River, 6/12/1951, *Esterhuysen 19440* (BOL); Kruispad, Oudtshoorn Division, 24/11/1949, *Compton 21752* (NBG); Ruytersboch, Mossel Bay Division, –/9/1909, *Britten 137* (GRA); Berg Pass, Mossel Bay Division, 4/4/1959, *Barker 8924* (NBG), 5/4/1959, *Barker 8929* (NBG).

Without locality: Cap.B.Spei., *Niven s.n.* (BM, BR-MART), *Roxburgh 10* (BM, G), prope Georgetown, –/10/1905, *Hops s.n.* (BOL *10442*), *Hesse s.n.* (GOET-WENDL, MEL), *Thunberg s.n.* (LINN-SMITH *397/2*), *Sparrmann ? s.n.* (LINN-SMITH *397/3*), *Sparrmann s.n.* (LD, S), *Thunberg s.n.* (UPS *5716/c*), (UPS *5717*).

Amongst those species with a large conical anther-gland and with needle-like staminodes, *Acmadenia tetragona* is distinct in having leaves opposite, decussate, complicate, strongly keeled and sub-orbicular when pressed flat. Its distribution appears to be limited to the Outeniqua Mountains from Cloetes Pass to the Robinson Pass. It is commonly known as the Pagoda flower.

6. ACMADENIA sectio **ALBIFLOS** Williams, sect. nov. propria propter florem petalis niveis ad fauce approximatis et fructos carpellis ad apicibus bifidis.

Section *Albiflos* is distinguished by having flowers with snow white petals, bulged inwards at the throat and fruits with carpels bifid at the apex.

Contains species:

31. *A. faucitincta*
32. *A. nivea*
33. *A. candida*

31. Acmadenia faucitincta Williams, sp. nov., propria propter florem ad faucem tinctam et in omnes partes quam illis *A. niverarum* et *A. candidarum* grandiorem.

Frutex graciles. *Rami* pauci, laxiusculi, graciles, glabri, leves, sparsim 2-chotomi. *Ramuli* pauci, graciles, breves, erectiusculi, glabri, foliis occultis. *Folia* 5,5–8,5 mm longa, 1,4–2 mm lata, lanceolata, obtusa, sessilia, glabra, opposita, 4-faria, imbricata, erecta, rubescentia, pauci glanduloso-punctata, marginibus late translucentibus ciliatis vel eciliatis. *Inflorescentia* terminalis; *flos* 12 mm diam., 2,5 mm pedicellatus, bini vel quaterni. *Bractea* 7,2 mm longa, 2,2 mm lata, folio simili. *Bracteolae* duae, 5 mm longae, 1,5 mm latae, oblongae, glabrae, indistincte glanduloso-punctatae; costis sparsim pubescentibus; apicibus incrassatis purpurascentibus; marginibus late translucentibus ciliatis. *Sepala* quinque, 5,2–5,8 mm longa, 2,6–3 mm lata, elliptica, obtuso-apiculata, glabra, purpurascentia, sparsim glanduloso-punctata, marginibus late translucentibus ciliatis. *Petala* quinque, 11,5 mm longa; *limbus* 5 mm diam., orbicularis, apiculata, glaber, niveus, patens; *unguis* 6 mm longus, glaber, tinctus. *Staminodia* quinque, 0,6 mm longa, glabra; glandula, 0,2 mm diam. coronata. *Filamenta* quinque, 2 mm longa, glabra, acicularia, erecta. *Antherae* quinque, ante anthesin 1,8 mm longae, 0,7 mm latae, subroseae; glandula 0,15 mm diam. coronata. *Pollen* 62 μ longum, 32 μ latum, oblongum. *Discus* obvallatus, ovarium excedens. *Stigma* 0,6 mm diam., depresso-capitatum. *Stylus* brevis, glaber, erectus. *Ovarium* 5-carpellatum, 8 mm diam., glabrum; *carpellum* ad apicem bifidum scabridum. *Fructus* et *semen* a nobis non visa.

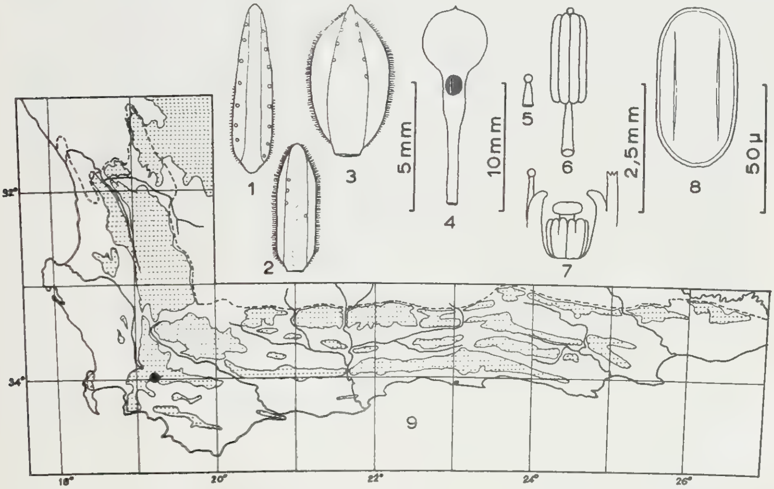

FIG. 28.
Acmadenia faucitincta: 1, leaf. 2, bracteole. 3, calyx lobe. 4, petal. 5, staminode. 6, anther. 7, gynoecium and disc. 8, pollen. 9, distribution.

Type: CAPE—3319 (Worcester): Blokkop above Villiersdorp, Caledon Division (-CD), 5/11/1978, *Esterhuysen 35110* (BOL, holotype).

Shrubs slender, amongst bush and restios. *Branches* few, somewhat lax, slender, glabrous, smooth, leaf scars not prominent, dichotomously branched. *Branchlets* few, slender, short, somewhat erect, glabrous, hidden by the leaves. *Leaves* 5,5–8,5 mm long, 1,4–2 mm broad, lanceolate, obtuse, glabrous, opposite, decussate, imbricate, erect, sessile, reddened; abaxial surface smooth with few indistinct gland dots to either side, with the midrib rounder and somewhat translucent; translucent margins ciliate becoming eciliate. *Inflorescence* terminal; *flowers* 12 mm diam., white with the pedicel about 2,5 mm long, usually in groups of two opposite pairs. *Bract* 7,2 mm long, 2,2 mm broad, leaf-like at base of pedicel. *Bracteoles* two, 5 mm long, 1,5 mm broad, oblong, halfway up the pedicel, glabrous except for a few hairs on the lower part of the midrib; apex purplish, thickened; margins ciliate, broadly translucent, one or two indistinct gland dots towards the inner side. *Calyx lobes* five, 5,2–5,8 mm long, 2,6–3 mm broad, elliptic, obtuse-apiculate, glabrous, reddened above, ciliate, gland dots in two rows above, margins broadly translucent. *Petals* five, 11,5 mm long overall; *limb* 5 mm diam., orbicular, apiculate, glabrous, snow-white, spreading; *claw* 6 mm long, 1,7 mm broad above, 0,7 mm broad at base, glabrous, bulged inwards at the throat where a more or less round coloured patch can be seen. According to Miss Esterhuysen "Claws of petals olive-green below, purple-red-brown above, bordered with dull off-white, and form a very conspicuous centre". *Staminodes* five, 0,6 mm long, glabrous, narrowing above to a globose apical gland 0,2 mm diam. *Filaments* five, 2 mm long, glabrous, acicular, erect. *Anthers* five, 1,8 mm long, 0,7 mm broad, somewhat pinkish; apical gland about 0,15 mm diam., globose, very short stipitate. Pollen 62 μ long, 32 μ broad, oblong. *Disc* obvallate, exceeds the ovary by a long way closing slightly over it, level on top, pale green. *Stigma* 0,6 mm diam., capitate, disc-shaped. *Style* short, glabrous, erect. *Ovary* 5-carpellate, 8 mm diam., glabrous; apices 2-lobed, scabrid. *Fruit* and *seed* not seen.

As far as is known this species has only been collected once and that was by Miss Elsie Esterhuysen in November 1978. Its great interest lies in the fact that it forms part of a series of three very similar plants all from the high mountains of the extreme South west Cape, which show a progressive reduction in size of the floral parts and in the number of carpels in the ovary. *A. faucitincta, A. nivenea* and *A. candida* have each 5, 3 and 2 carpels in the ovary in that order.

SPECIMENS EXAMINED

Type only; as above.

Acmadenia faucitincta is recognised as distinct having the throat of the flower strikingly coloured. Of those species with snow-white flowers and bifid carpels, *A. faucitincta* is also distinct in having a 5-carpellate ovary and in having flowers and all floral parts much larger.

32. Acmadenia nivea Williams in Jl S. Afr. Bot. **44**(4): 350 (1978). Type: CAPE—3418 (Simonstown): marshy ground, peaty soil, amongst restioids, Steenbras catchment area, Kogelberg, Caledon Division (-BB), 1 265 m (4 150 ft.), 13/6/1975, *Williams 2006* (NBG, holotype).

Acmadenia nivea is recognised as distinct on account of having glabrous lanceolate leaves, snow-white petals closing the throat of the flower, staminodes varying from 0,09 to 0,5 mm long, anthers with minute ± sessile apical glands and a 3–4 carpellate ovary. It is nearest to *Acmadenia candida*, a smaller plant, in which however the ovary is reduced to only two carpels.

33. Acmadenia candida Williams in Jl S. Afr. Bot. **44**(4): 352 (1978). Type: CAPE—3419 (Caledon): in a marsh on level area, top of road from Nuweberg Forest Station, mixed up with low dense Restionaceae, east slopes of Landdrost Kop, Caledon Division (-AA), 1 070 m (3,500–4 000 ft.), 17/3/1968, *Esterhuysen 31946* (BOL, holotype).

Acmadenia candida is recognised as distinct on account of being an extremely slender glabrous plant with few branches, with white petals, with reduced staminodes, with anthers minutely stipitate glandular and with a 2-carpellate ovary. It is closest to *A. nivea* which however has staminodes somewhat less reduced and an ovary with 3 or 4 carpels.

SPECIES EXCLUDED

1. *Acmadenia apetala* Dümm. in *Fedde Repert.* **11**: 121 (1912).

This is *Diosma apetala* (Dümm.) Williams in Jl S. Afr. Bot. **40**(4): 278 (1974).

2. *Acmadenia assimilis* Sond. in Fl. Cap. **1**: 383 (1860).

This is *Euchaetis laevigata* Turcz. in Bull. Soc. Imp. Nat. Mosc. **31**(1): 438 (1858).

3. *Acmadenia barosmoides* Dümm. in Journ. Bot. **51**: 221 (1913).

This is *Phyllosma barosmoides* (Dümm.) Williams in Jl S. Afr. Bot. **47**(4): 755 (1981).

4. *Acmadenia cassiopoides* Turcz. in Bull. Soc. Imp. Nat. Mosc. **31**(1): 439 (1858).

This is *Macrostylis cassiopoides* (Turcz.) Williams in Jl S. Afr. Bot. **47**(2): 192 (1981).

5. *Acmadenia diosmoides* Schltr. in Bot. Jb. **24**: 439 (1898).

This is *Euchaetis diosmoides* (Schltr.) Williams in Jl S. Afr. Bot. **40**(4): 280 (1974).

6. *Acmadenia harveiana* Schltr. ms. Dümmer in Fedde Repert. **11**: 121 (1912) nom. nud.

This *Euchaetis pungens* (Bartl. & Wendl.) Williams in Jl S. Afr. Bot. **40**(4): 279 (1974).

7. *Acmadenia laevigata* Bartl. & Wendl. Diosmeae in Beitr. Bot. **1**: 64 (1824).

This is *Euchaetis meridionalis* Williams in Jl S. Afr. Bot. **44**(4): 329 (1978).

8. *Acmadenia laevigata* E. Mey. ms. in Drège, Zwei. Pflanz. Doc. 122, 161 (1844).

This is *Euchaetis laevigata* Turcz. loc. cit.

9. *Acmadenia macrostylioides* Schltr. ms.

This is *Euchaetis elsieae* Williams in Jl S. Bot. **40**(2): 85 (1974).

10. *Acmadenia marlothii* Dümm. in Ann. Bol. Herb. **3**(2): 86 (1921).

This is *Agathosma rudolphii* Williams in Jl S. Afr. Bot. **41**(4): 239 (1975).

11. *Acmadenia pungens* Bartl. & Wendl. Diosmeae in Beitr. Bot. **1**: 64 (1824).

This is *Euchaetis pungens* (Bartl. & Wendl.) Williams in Jl S. Afr. Bot. **40**(4): 279 (1974).

12. *Acmadenia rosmarinifolia* Bartl. in Linnaea **17**: 335 (1843).

This is *Agathosma rosmarinifolia* (Bartl.) Williams in Jl S. Afr. Bot. **39**(2): 179 (1973).

PHYTOGEOGRAPHY

The choice in placing a plant into a genus is perhaps rather arbitrary because in nature the occurrence of certain characters appears to be quite at random and many possible permutations of these seem to occur. In the case of the genus *Acmadenia* it seemed more practical to propose six sections rather than to create several more genera. In the definition of these sections certain characters are given more weight than others or one may say loosely that some species look more alike than others. It was interesting to see therefore that, when the distribution of the species in these six sections were mapped separately, a pattern emerged. (Figs 29 to 34).

Starting with *Section 1, Macrostylioides* (Fig. 29) with only one species, standing very much on its own, with pedicellate flowers, bearded petals, flat leaves and long horned fruits and with *Section 2, Peltatiglandula* (Fig. 30) in which there are three species with unusual glandular denticulate leaves and

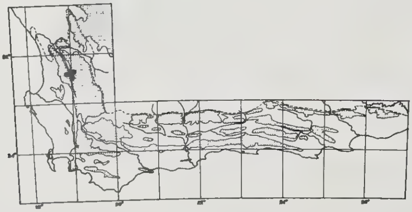

FIG. 29.
Section 1, Macrostylioides: Distribution.

with staminodes and apical anther glands much reduced, these occur in the Clanwilliam Division in the mountains of the South western Cape Province.

In *Section 3, Patentipetalum* (Fig. 31) are grouped seven species in which the flower stands open exposing the anthers and the gynoecium and the anthers all are crowned with a small apical gland. Species in this group are spread over the high mountains of the South western Cape up to Clanwilliam and eastwards along the Swartberg Mountains.

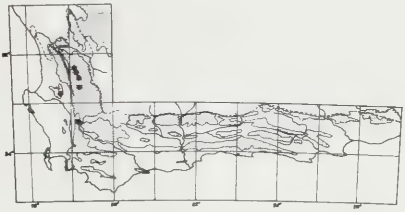

Fig. 30.
Section 2, Peltatiglandula: Distribution.

In these three groups which appear to be from very ancient habitats on isolated mountain areas, we have species that have perhaps not yet developed the closed throat as found in the remaining three sections. These species in Sections 1, 2 and 3 are all very distinct from each other. Many of them are found growing in almost what may be termed "refuge" situations in rock crevices or amongst massive T.M.S. rocks. This may mean that plants in these sections speciated a very long time ago.

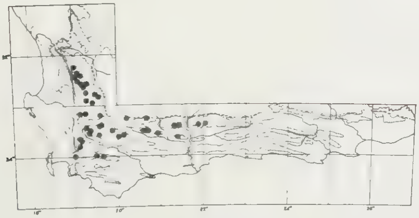

Fig. 31.
Section 3, Patentipetalum: Distribution.

In *Section 4, Glandula* (Fig. 32), containing eleven species, one finds perhaps the most typical species of *Acmadenia* in which the petals are bulged inwards at the throat more or less concealing the gynoecium with

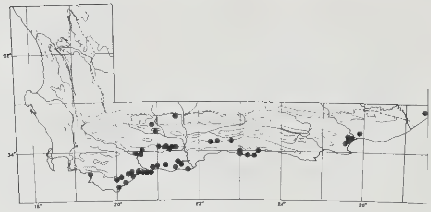

FIG. 32.
Section 4, Glandula: Distribution.

smallish staminodes and with anthers bearing a small apical gland. Species in this section with one or two exceptions, occur at much lower levels including the coast from Walker Bay to near East London in what must be relatively recent habitats.

In *Section 5, Acmadenia* (Fig. 33), containing eight species all with the throat more or less closed, the development of the staminode and of the apical gland or the anther reaches its fullest extent. These species are concentrated in an area between Cape Agulhas and Mossel Bay and inland towards the Swartberg Mountains. Here plants are found on Coastal Limestone, on relic hills of silcrete and on mountain slopes, all habitats that are perhaps relatively not so very ancient. The species in Sections 4 and 5 are almost all rather similar in appearance to each other and include some that are obviously very closely related. This may mean that plants in these sections have speciated relatively recently.

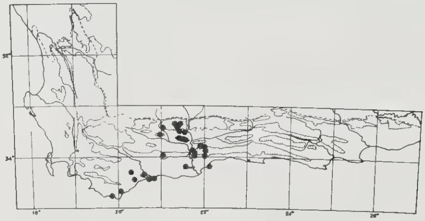

FIG. 33.
Section 5, Acmadenia: Distribution.

Finally in *Section 6, Albiflos* (Fig. 34), containing three species, we see a graduated retreat into reduction. These species are concentrated in the high mountains in the vicinity of the Hottentots Holland in an area well known for its great variety and number of endemics. Here one asks the question, is

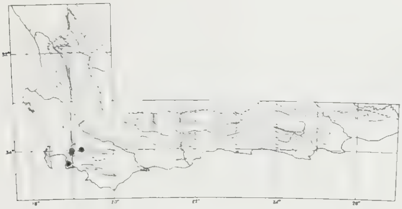

Fig. 34.
Section 6, Albiflos: Distribution.

this reduction perhaps the result of pressure from a multitude of other plant species in an area of more than adequate rainfall?

In looking at all six distribution maps an overall picture emerges of growth in numbers of species and of spread from the Clanwilliam area towards the south and towards the east into more recent habitats. The species in the section *Albiflos* being so very different may perhaps represent another line of development and reduction. The fact that no species of *Acmadenia* is to be found on the western coastal plain from False Bay northwards or on the Cape Peninsula probably indicates that these areas were perhaps until recently under the sea or otherwise hostile to plants of this genus.

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